HANDBOOK

FOR THE

12-PR. B.L. 6 CWT. GUN

(MARK I).

(HORSE ARTILLERY.)

1898.

LONDON:
PRINTED FOR HER MAJESTY'S STATIONERY OFFICE,
BY HARRISON AND SONS, ST. MARTIN'S LANE,
PRINTERS IN ORDINARY TO HER MAJESTY.

And to be purchased, either directly or through any Bookseller, from
EYRE & SPOTTISWOODE, East Harding Street, Fleet Street, E.C.; or
JOHN MENZIES & Co., 12, Hanover Street, Edinburgh, and
90, West Nile Street, Glasgow; or
HODGES, FIGGIS, & Co., Limited, 104, Grafton Street, Dublin.

1898

Price One Shilling.

HANDBOOK

FOR THE

12-PR. B.L. 6 CWT. GUN

(MARK I).

(HORSE ARTILLERY.)

1898.

V
LONDON:
PRINTED FOR HER MAJESTY'S STATIONERY OFFICE,
BY HARRISON AND SONS, ST. MARTIN'S LANE,
PRINTERS IN ORDINARY TO HER MAJESTY.

And to be purchased, either directly or through any Bookseller, from
EYRE & SPOTTISWOODE, East Harding Street, Fleet Street, E.C.; or
JOHN MENZIES & Co., 12, Hanover Street, Edinburgh, and
90, West Nile Street, Glasgow; or
HODGES, FIGGIS, & Co., Limited, 104, Grafton Street, Dublin.

1898
Price One Shilling.

244

CONTENTS.

	PAGE
Description of Gun and Fittings	3
Care and Preservation of Gun and Fittings	8
Description of Rifles, Aiming, M.-H. Chamber, Ewart	10
Method of Fitting, &c. „ „ „	11
Description of Carriage	12
„ Limber (Carriage and Ammunition Wagon)	13
„ Ammunition Wagon	14
„ Forge Wagons and Limbers	16
„ Store Wagons and Limbers	17
„ Ammunition and Store Wagon, R.A.	19
General Instructions for Care and Preservation of Vehicles	21
Description of Projectiles	23
Fixing Plugs and Fuzes	25
Distinguishing Marks on Projectiles	25
Description of Fuzes	25
„ Cartridges	27
„ Tubes	28
Range Table	30
Mekometer, and history sheet	31, 32
Section Gun Drill	33
List of Stores carried (Carriage, Limbers and Ammunition Wagon)	49
„ Materials for Repair of Vehicles	52

DIAGRAMS OF PACKING.

Carriage, Limbers and Ammunition Wagon	A
Forge Wagons and Limbers	B
Store „ „	C and D

PLATES.

Gun	I.
Breech Mechanism	II.
Sighting	III.
Carriage	IV.
Limber	V.
Ammunition Wagon	VI.
Wagon, Ammunition and Store, R.A.	VII.
Shrapnel Shell	VIII, IX.
Case Shot	X.
Fuze, T. and P., No. 56, Mark IV	XI.
Cartridges	XII.
Tubes, T., friction (Service and Drill)	XIII, XIV.

LITHOGRAPHS.

Limber and Carriages	1. Off side and Front.	Boxes closed
	2. Near side and Rear.	„ open
Limber and Wagon	1. Off side and Front.	„ closed
	2. Near side and Rear.	„ open
Teams	1. Near side	
	2. Off side	
Forge Wagon and Limber		
Store Wagons and Limber	Mark I	
	„ II	

N.B.—This Handbook is corrected up to December, 1898. Any alterations which may be suggested should be forwarded direct to Chief Inspector, Royal Arsenal, Woolwich.

ORDNANCE, B.L., 12-PR., 6 CWT. (MARK I.)

GUN.

(*Plate I.*)

Material			Steel (wire construction).
Weight	of gun, without fittings		6 cwt. 14 lb.
	of breech fittings		1 qr. 1 lb.
Length, total			66·75-in.
Bore	calibre		3-in.
	length		59 „ = 19⅔ calibres.
Chamber	diameter		3·2 „
	length (to base of projectile)		8·35„
Rifling	system		Polygroove—hook section.
	length		49·25-in.
	twist		Increasing from 1 turn in 105 calibres at breech end of rifling to 1 in 28 at 15-in. from the muzzle; the remainder uniform 1 turn in 28 calibres.
	grooves	number	18
		depth	·04 of an inch.
		width	·4 „ „

The gun is made of steel and wire, and consists of an A tube, around which are wound successive layers of steel wire, extending over the chamber and a portion of the bore. The jacket with trunnions is fitted over the exterior of the wire and a portion of the A tube, and secured longitudinally by a shoulder on the A tube, and a steel breech bush screwed into the jacket at the rear. The breech bush is prepared for the reception of the breech screw, and furnished with lugs for the attachment of the breech fittings and elevating mechanism; the rear portion of the bush also forms a hood for the protection of the fittings. The B hoop is shrunk round the A tube immediately in front of the jacket, by which it is partially overlapped.

The chamber is cylindrical, slightly coned at the entrance, and terminating in front with a curved slope.

On a certain number* of guns, a plane for clinometer is prepared on the exterior of the jacket at the breech, but no more will be so prepared.

Breech-closing mechanism.

(*Plate II.*)

The breech is closed by a parallel screw having three portions of the screw thread removed longitudinally, each one-sixth of the circumference. The interior of the gun at the breech being prepared in a similar manner, admits of the screw, when the raised portions are placed opposite the smooth surfaces in the gun, being pushed home, and locked by the sixth of a turn.

* Nos. 4, 5, 6, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25 and 28 only have the clinometer plane.

The breech screw has hinged to it a cam lever, by means of which it is locked and unlocked; the cam portion of the lever (when the breech-screw is locked) falls into a recess in the carrier ring, and so prevents any movement of the breech screw during firing. In lowering the cam lever, after the breech screw is unlocked, the cam acting upon the surface of the carrier ring, starts the first movement to the rear of the breech screw and obturator.

Encircling the rear end of the breech screw, and hinged to the hood, is a carrier ring, which supports the screw when withdrawn.

The carrier ring is held to the gun during the withdrawal of the breech screw, by means of a clip fitted to the left side of the ring, engaging with a recess in the hood.

A stop bolt in the right side of the carrier ring serves to prevent the breech screw being disengaged from the carrier ring when withdrawn; at the same time, the clip in the left side of the carrier ring is disengaged from the recess in the hood by means of a spiral spring, which forces the opposite end of the clip into a recess in the breech screw, thus securing the latter in the carrier ring. When in this position, the whole can be swung clear of the breech opening to admit of loading.

If, when opening the breech, the carrier ring remains fast, owing to the "clip retaining" not working properly, the latter can be pushed back by inserting the punch end of the breech mechanism wrench, in the hole provided for this purpose, on the left side of the breech.

Firing Mechanism.

The firing mechanism is designed for friction firing, with "T" friction tubes.

It consists of a steel axial "T" vent, passing through the centre of the breech screw, having secured to its outer end a head for the reception of the "T" friction tube. The axial "T" vent is retained in position by means of a spring catch in the breech screw. Fitted to the outer face of the breech screw and encircling the head of the axial "T" vent is an actuating collar, worked by the cam lever, by means of which the "T" tube is automatically turned into the firing position, and the vent sealed when the cam lever is lowered. The "T" tube is automatically released from the vent and turned into the position for withdrawing when the cam lever is raised, the tube being withdrawn by hand.

A "T" vent rimer is provided for clearing the taper portion of the vent channel in the "T" vent, in the event of it getting choked, so as to admit of the insertion of the tube.

Sighting.

(*Plate III.*)

The gun is side sighted and is provided with two rows of sights.

The tangent sights are of steel; the cross heads are furnished with screw deflection leaves, giving deflection to 1½ degrees right and left, and having notches at the top and small eye holes underneath. The bars are triangular in section and are graduated on the rear face to 4,000 yards for a muzzle velocity of 1,553 ft. secs., and on the right face to 13 degrees. The sights fit into bronze sockets held by fixing screws, and are provided with movable clamps. The bronze sockets are set at an angle of 1° 30′ for correction for drift,

Spring bolts, passing through the sockets, enter recesses in the sight bars when at zero, and prevent their being shaken out when the gun is passing over rough ground. The bolt on the right side is moved by pushing in, and that on the left, by pulling out, so as to make the sights interchangeable.

The foresights are of bronze, with circular apertures containing an aluminium blade projecting from the left side to the centre, surmounted by a steel acorn point. The sights are interchangeable, and slide into grooves in front of the trunnions, being retained by spring studs, which are released by raising the catches provided for the purpose.

The sight is correctly set—

For elevation.—When no space can be seen between the line marking the graduation ordered and the top of the clamp, while the line is not covered by the clamp.

For deflection.—When the line marking the graduation ordered is exactly in continuation of the arrow head.

Telescopic Sight.

The guns have been fitted with a steel bracket for carrying the telescopic sight. The bracket is firmly attached to the face of the right trunnion by a dovetail and two fixing screws. A bronze adjusting screw is provided in the upper part of the bracket, to alter the position of the telescope, so as to correct for difference of level of the wheels. The edges of the bracket are rounded to avoid the liability of damage to the clothing of the number mounted on the axletree seat. A leather cover for the bracket is provided, shaped to suit the bracket, and secured in position by a $\frac{3}{8}$-in. strap.

Description and instructions for using, &c., are published in a separate handbook.

De Bange Obturator.

The obturator consists of a mushroom-headed axial "T" vent of steel, passing through the centre of the breech screw, with a pad and pair of metal discs. The inner face of the breech screw is flat, and between it and the head of the axial "T" vent the pad and discs are arranged. The pad is made of asbestos, worked up with mutton suet to a proper consistency, and enclosed in a strong canvas cover; it is reduced to shape and pressed in a hydraulic machine. The word "front" will be marked on the front of the pad, and the word "rear" on the rear part. The pad is enclosed between two tin discs, the outer angles of which are protected by steel rings. The words "front" and "rear" will be marked on the inner faces of the front and rear discs respectively. The gun is slightly coned at the seat of the obturator when pushed home, and the pad is provided with a corresponding taper to insure a good fit.

In putting the obturating pad and discs on the vent axial, first place the front protecting disc with its rounded side fitting the back of the mushroom head, then the pad with that side to the front which is curved to fit the front disc, the stitched side being to the rear, then the rear protecting disc, and in placing this, its flat side and bronze ring with which it is bushed should be on the opposite side to the pad.

If correctly assembled, the whole should fit together compactly. Should there be any play between the obturator and the face of the breech screw, owing to slightly varying dimensions of the pads, and their becoming compressed by firing, one or more steel adjusting discs are placed behind the protecting disc.

The pads issued on the breech screw with a gun have always been previously expanded in that gun, but the first time any other pad is used it should be with a full charge and projectile.

Action.

When the breech screw is pushed into the gun, the obturator enters the chamber with perfect ease; on turning the breech screw, the obturating pad is pressed home into the coned seat in the gun by the travel of the screw. The bore is thus perfectly closed by a species of buffer in contact all round the circumference, while the head of the axial "T" vent receives the force of the gas on discharge. On firing the gun, the pressure acts on the head of the vent, and compresses the pad against the breech screw, causing it to expand laterally; from symmetry of form and position, this expansion must be radial to the axis and equal in every direction, and is sufficient to prevent the escape of the gas. On the pressure being removed, elasticity comes into play, and the obturator can be withdrawn from the cone by a straight pull, which can be given as soon as the screw is unlocked.

The pads are almost indestructible, except perhaps from the wear of opening and closing the breech, but if the firing is rapid they may get softened by heat; in this case, the pad should be changed and thrown into cold water for a time, when it will soon be restored to good condition again. Spare pads are provided, and also steel adjusting discs, which should be inserted between the rear protecting disc and the face of the breech screw if the pad becomes compressed by firing, but in all cases the obturating pad and discs should turn freely on the breech screw.

The outer canvas of the obturating pad should be free from rents; small bruises, likely to be removed by the pressure of firing, are of no importance.

If the pad is not in good order, or there are too many adjusting discs behind the pad, stiffness in working the breech will probably result.

The obturating pad should be rubbed occasionally with Russian tallow, mixed with oil or some other suitable lubricant, and the pad with protecting discs should be carefully handled to prevent them being indented or bruised.

The obturating pads and discs should be kept complete on the axial "T" vents in the guns, or in the brass boxes provided for the purpose, as there is a tendency of the pad to swell in the direction of its axis, which might cause difficulty in adjusting it on the breech screw.

To Remove the Breech Fittings.

Before removing the fittings, the breech should be opened, the breech screw being swung into the *loading* position.

Obturator.

Press down the lever of the spring catch in the breech screw, the axial "T" vent can then be withdrawn from the front of the breech-screw, and the obturating pad and discs removed from the vent.

When the obturator is attached to the breech screw, the removal of the latter from the carrier ring should be done by two persons, as care is necessary to keep the "clip, retaining, carrier ring" withdrawn clear of the breech screw before drawing the latter back, to avoid damaging the obturating pad and discs. The obturator should, however, always be detached, when possible, from the breech screw before removing the latter from the carrier ring.

Breech Screw.

When the breech is open, the breech screw is held in the carrier ring by a stop bolt on the right, and by the retaining clip of the carrier ring on the left. By withdrawing the retaining clip from the breech screw and holding it back (by means of a screwdriver used as a lever), the breech screw can be moved forward and the stop bolt pushed out from behind; the breech screw can then be withdrawn from the carrier ring, the retaining clip being held back until the breech screw is clear of the ring.

Carrier Ring.

This is attached to the breech by a hinge bolt secured by a keep pin. When the latter is taken out, the hinge bolt can be removed by giving it a few taps underneath with a piece of wood.

Clip, Retaining, Carrier Ring.

This retaining clip is actuated by a spiral spring, and retained in the carrier ring by means of a set screw. On the removal of the set screw, the clip and spiral spring can be withdrawn from the ring.

Collar, Actuating, "T" Friction Tube.

To remove the actuating collar from the breech screw, the cam lever must be lowered; the lever of the spring catch must then be pressed down, and the actuating collar turned to the left; the collar can then be removed to the rear.

Spring, Catch, Breech Screw.

To remove the spring catch, it must be pressed outwards, by means of a piece of wood (used as a lever in the interior of the breech screw), until the axis pin of the lever is clear of the exterior of the breech screw. The axis pin can then be removed, by means of a screwdriver, and the lever and catch, with spiral spring, withdrawn from the breech screw.

Cam Lever.

The cam lever must be lowered and withdrawn to the left.

To Re-Assemble the Breech Fittings.

The converse of the above action takes place in re-assembling the fittings on the gun.

Care must be taken, when placing the axial "T" vent and obturating pad and discs in the breech screw, to see that the indicating arrows engraved on the mushroom head of the axial "T" vent and the front end of the breech screw correspond, as it is in that position only that the spring catch in the breech screw, for retaining the obturator, will engage with the recess for its reception in the axial "T" vent.

Care and Preservation of 12-pr., 6 cwt., B.L. Gun and Fittings.

(Based on Instructions contained in "Regulations for Magazines and the Preservation of Artillery Matériel.")

A "Memorandum of Examination" is issued with each gun. It contains a drawing showing the principal dimensions, with a short description of the construction and rifling, as well as the particulars of any slight original defects or tool marks which may have existed at the date of issue. In it are recorded in detail the number of rounds fired, and the date and result of any examination.

This memorandum will remain in charge of the officer who has possession of the ordnance, and a certificate to the effect that it is in possession and complete up to date will be included in the Annual Return of Rifled Ordnance, Army Form G 872.

At the conclusion of each day's firing an entry will be made in the memorandum by the officer in charge, giving a detail of the rounds fired (including blank charges), so that an accurate record of the firing may always be kept up.

A statement of the results of the examination will be added to the memorandum by the inspecting officer or other examiner who performs the duty, and when the gun is returned into, or issued from, store, the memorandum will accompany the transfer vouchers.

If at any time the memorandum be lost or damaged, a duplicate can be obtained from the Chief Inspector, Woolwich, by whom also inside sheets for continuation of the record of the number of rounds fired will be supplied on demand.

The gun will, as far as possible, be examined after firing 150 rounds, or 175 rounds if specially sentenced for such number by the inspecting officer, and practice from such ordnance should cease until such examination shall have been carried out. In cases, however,

where such examination would happen within a series of round allowed for practice and thus cause inconvenience, the guns will be examined before practice commences, irrespective of the number being completed.

Should any accident occur, such as the bursting of a shell in the bore, the splitting of a vent-axial, &c., immediate inquiry will be made into the circumstances, and the guns examined. If the Commanding Officer considers the damage to be of importance he will send without delay a report of the circumstances through the same channel as his Annual Return, forwarding, if necessary for the illustration of his report, gutta-percha impressions of the damage done to the guns.

For purposes of computation, four rounds of blank charges may be regarded as equal to one round with projectile, but in recording the rounds on the memorandum of examination "blank" rounds should be shown as such.

The exterior of the guns are browned, and will be kept oiled, or when not in use covered with "grease, mineral, anti-corrosive." The bore will be cleaned and oiled.

At the close of each day's firing, the bore will be washed and placed under metal, and as soon as dry will be oiled and stopped with the tampeon.

Guns which are browned will, when necessary, be rebrowned locally.

Preservation of Sights.

The sights will be kept clean, free from grit, and oiled; the tangent sight bars should on no account be polished; the deflection nut and traversing screw of the tangent sight, and the spring stud and catch of the foresight should have free play.

The exposed portions of the sights are bronzed if made of gunmetal, and blued if of steel, in order to preserve them from corrosion, and on no account will these parts be cleaned or burnished in such a manner as to remove the bronzing or blueing.

Preservation of Fittings.

The breech fittings and bright parts of guns in store, or where rarely used, will be coated with "grease, mineral, anti-corrosive."

All removable fittings should be frequently taken apart and examined to ascertain that they are sound and in proper working order, and any in which a crack or flaw is observed should be exchanged.

All fixing and preserving screws should be occasionally removed and oiled.

If, when opening the breech, the carrier remains fast, owing to the "clip retaining" not working properly, the latter can be pushed back by inserting the punch end of the breech mechanism wrench in the hole provided for this purpose on the left side of the breech.

The obturating pad should be examined to see that the canvas covering is intact, and in proper order for use.

If a pad is found to be contracted it should be soaked in a hot mixture of olive oil and tallow; if, on the other hand, it is swollen or warped, and difficulty is experienced in getting the fittings into

position, it should be warmed through till soft, placed in position, the breech closed, and a few blows given to the mushroom head of the axial "T" vent by means of a stave passed down the bore from the muzzle.

The protecting discs should also be carefully examined, and if the tin be fused or the steel rings eroded, burred, or cracked, should be replaced by new discs.

When fitting the pad and protecting discs on the breech screw care must be taken that they are in correct order. The face of the pad marked "front" should be towards the muzzle, and the discs should be placed in front or rear of the pad as marked. One or more steel adjusting discs may be required between the obturator and the face of the breech screw when the pad is compressed by firing, but the obturator should always turn freely.

The breech fittings should be kept clean, oiled, or greased, and in good working order; all working surfaces must be well lubricated, the fittings being taken off sometimes for this purpose, especially after firing.

To lubricate the hinge bolt of the carrier ring without removing the fittings, the small screw on the top of the hinge bolt should be removed and oil poured into the channel, taking care to replace the screw after oiling.

All fittings of the gun should be treated with care; violence and jerks should be avoided, and no unnecessary force should be employed.

The breech fittings should work easily and be free from cracks and burrs; the latter can be removed by filing, but this must be done carefully so as not to permanently damage the fitting. Should a crack be observed in a breech fitting such fitting should be exchanged.

The threads of the breech screw should be free from burrs; should the screw not work easily when the obturator has been detached, the defect may often be remedied by careful filing, but no portion of the thread should be cut away to remove a crack.

The breech should be kept covered by the leather cap provided for this purpose, to prevent dust and grit getting into the interstices of the breech fittings.

Transport.

In preparing the guns for transport the sights only will be removed, the guns with their components being packed in boxes, the sights being also packed in the same boxes separately.

Rifles, Aiming, M.-H. Chamber, Ewart B.L., 12-pr., 6 cwt.

This apparatus is for use with the gun in imparting instruction in laying, and consists of the following parts:—

Rifle, aiming, M.-H. chamber, Ewart—

Bands— ..	..	.. bronze.
Front, B.L., 12-pr., 6 cwt.		with securing bolt, nut, and washer
Rear „	„	„ with securing bolt, nut, and washer, buffer, and key
Barrel, rifle	..	.. M.-H. rifle barrel, with breech action and metal boss.
Cord, firing	..	.. white line, tarred, 2 yards long, with two hooks.
Link, trigger	..	.. bronze, with fixing screw.

Tube, 0·23-in., J .. .. Morris, with breech-piece, bushes (movable and fixed), set nut, and leather washer.

Tube, 0·23-in.—
Brush, cleaning.
Key, M.-H.
Rod, cleaning.

Method of Fitting, Adjusting, and Using the Apparatus.

The aiming rifle is fitted to the left side of the gun in the following manner:—

The two bands are placed over the exterior of the gun, the front band over the chase immediately in front of the B hoop, and the rear band over the jacket, the distance between the inner faces of the bands being 27 in. The bands are secured round the gun by securing bolts. The muzzle of the rifle is passed through the hole in the arm projecting from the front band, and the breech is placed in the socket on the rear band, and fastened with a key. A buffer spring, to lessen the strain on recoil, fits into the socket in rear of the rifle. A hole is made at the rear end of the socket to facilitate the extraction of the buffer spring.

To adjust the rifle on the gun, the latter is laid horizontally; the ·23-in. tube is then inserted in the bore of the rifle, sufficient length being allowed to project from the bore to admit of the application of a spirit level to the ·23-in. tube, by which means the rifle is levelled, so that the axes of rifle and gun are in parallel horizontal planes. The bands are then firmly screwed up, care being taken to see that they do not shift during the operation, in the event of which they must be slackened and re-adjusted.

Elevation is obtained by means of the gun sights, and any error in line is corrected by use of the deflection scale.

The rifle is fired by means of the firing cord, which is attached at one end by means of a hook to the loop of the trigger link, the other end of the cord being led round the breech of the gun to the firing number.

CARRIAGE, LIMBERS, AND WAGONS.

Carriage, Field, B.L., 12-pr., 6 cwt., Mark I.
Limber, Field, B.L., 12-pr., 6 cwt., Mark I.
Wagon, Ammunition, B.L., 12-pr., 6 cwt., Mark I.
Wagon, Forge, R.A., Mark I*.
" " " " II.
Limber, Wagon, Forge, R.A., Mark I**.
" " " " " II*.
Wagon, Store, R.A., Mark I.
" " " " II.
Limber, Wagon, Store, R.A., Mark I*.
" " " " " II*.
Wagon, Ammunition and Store, R.A., Mark II*.

Carriage, Field, B.L., 12-pr., 6 cwt.

(*Plate IV.*)

The carriage consists, generally, of two side brackets and elevating gear, mounted on an axletree having 2nd class arms, and field wheels.

The side brackets are connected by transoms and the plate portions of the trail eye, and are made of steel plate, riveted to angle steel frames, which are formed at the upper ends into bearings for the gun trunnions. Two compartments are formed between the brackets, each being fitted with a wood block, the upper one to contain a McMahon spanner, a pair of pincers, a claw hammer and a spoke brush, and the lower a No. 9 oil can.

The trail eye (No. 20) is of wrought-iron, the eye being fitted with a movable piece of hard steel.

The axletree (No. 89) is a tubular steel forging with 2nd class arms; it is passed through a hole in the front of each bracket, and is secured in position by flanges, which pass over octagons cut on the axletree. The axletree is also connected to the brackets by a tensile stay on each side.

The wheels are 2nd class, "C," No. 35*, 5 ft. in diameter, with steel nave, removable pipe box, and a 3-in. steel tire with rounded edges. The nave consists of two flanges of corrugated steel, which are connected by 14 bolts; the inner flange is fitted with a steel ring to strengthen it, and the outer flange with a metal centering ring; the pipe box passes through the flanges, and is secured by a nut, which is prevented from working loose by a spring fixed to the pipe box. A spanner (No. 93) is provided for removing the pipe box; it is carried on the right carriage bracket.

A shell pocket is fitted on each side of the trail (near the axletree), and each will hold two Shrapnel shell, one case shot, and three cartridges. The shell pockets will carry ammunition in addition to that carried in the ammunition boxes.

The elevating gear (which is actuated by a hand-wheel on the right side of the carriage) consists of an elevating screw, bevel pinions, elevating nut, spindle and hand-wheel, the whole being carried by an oscillating bracket, which is supported in bearings attached to the brackets.

The carriage is furnished with shoe brakes and a drag shoe.

The brake consists of two brake shoes, two steel wire ropes, two sets of suspending chains, and two drag washers with Q link. The brake shoes (which are in one steel forging with the sides splayed out to the front), are attached to the sides of the carriage near the trail eye by the wire ropes; the inner sides are connected by the suspending chains to the axletree, and when in use, the outer sides are connected with the drag washer. The drag washer has a loop for use with the drag rope, and on the opposite side, a Q link or sliding hinged hook, similar to that used for traces.

In action, the shoes are placed on the ground behind and against the wheels, and the outer suspending chains are connected to the drag washers. On recoil, the wheels of the carriage run on the brake shoes, the steel wire ropes being of sufficient length to ensure the wheels riding on the shoes during recoil. On running up, the wheels leave the shoes, which remain in position for the next recoil. When not in use, the shoes and outer suspending chains are hung on hooks

---

* In future manufacture No. 35A wheel will be supplied.

(the chains being first placed on the hooks and the shoe being turned over before being hooked up) fixed to the axletree for the purpose, and the wire rope placed on hooks on either side of the trail.

For travelling, a drag shoe (No. 7) is provided; it is attached by a No. 18 chain to the under side of the trail, and, when not in use, is hung on a hook fixed to the breast of the carriage, the chain being placed on a hook on the right side (travelling) of the carriage.

A traversing handspike (No. 2) fits into a socket which is hinged to the lower part of the trail. In action, the socket is held in position by a pawl; when travelling, it is turned over, and the handspike is strapped to the top of the trail; this handspike is also used as a rammer.

The carriage is furnished with a loop and hooks for the drag shoe and chain, advance rings, hooks for sponge buckets, locking plates, and fittings for carrying two aiming posts. (*See* packing diagram A.)

* Limber, Field, B.L., 12-pr., 6 cwt.

(*Plate V.*)

The limber consists of a frame and an ammunition box, mounted on a 2nd Class axletree and field wheels, a pole with draught chains, and supporting bar, and two steel swingletrees.

The frame consists of four futchels; the two inner are of steel plate, flanged top and bottom, with holes bored in the deepest part to suit the axletree; the two outer futchels are of angle steel, and are bolted to brackets which connect them to the axletree. Diagonal stays, of angle steel, are attached to the outer futchels, over the axletree, and to the inner futchels at their forward ends, where the staple for the pole is riveted between them. A platform and a footboard are bolted to the top, and draught hooks (for the swingletrees), to the front of the outer futchels. At the rear, brackets are fitted on each side of the limber hook for a wood shelf, to facilitate the setting of fuzes.

The ammunition box is of wood; it is fitted with two lids, a striking plate (to take the blow of the trail when limbering up), and cranked guard irons with leather guards. The box is fitted internally with partitions, and arranged to carry a supply of Shrapnel shell, case shot, cartridges, fuzes and friction tubes.† The projectiles are carried upright, the bottoms fitting in wood pieces attached to trays, which are fixed to the bottom of the box; the projectiles are steadied at the top by wooden blocks, which fit between their heads, and are held in notches lined with aluminium (in the top of the partitions, and the ends of the box) by wood battens attached to the lid. Two cartouches (each holding 22 cartridges) and four fuze boxes (two No. 20, one No. 21, and one No. 28) are carried in suitable compartments. A leather holdall for gun fittings, &c., is attached to the inside of each lid.

Fittings are attached to the rear of the box for securing two portable magazines.

A wrought-iron limber hook (No. 13), with movable steel, is riveted to the inner futchels.

The axletree (No. 98) is of weldless steel tube with 2nd Class arms; it is fixed to flanges, which are attached to the futchels.

---

* The limbers for carriage and ammunition wagons are alike.

† When the compartment for tubes is not full it will be packed up with sponge cloths, to prevent jolting.

The fittings for draught consist of a pole (12 ft. 7 in. long), two No. 10 swingletrees, a No. 2 supporting bar (3 ft. 2½ in. long), with a steel socket with loop at each end, and two No. 2 draught chains, each about 2 ft. 10½ in. long, with a ring at one end and a Q at the other.

The wheels, No. 35 "C," are the same as those described for the carriage.

The limber is fitted on the underside to carry a 3-lb. grease box and a No. 3 lubricating can, and on the "near" side of the platform board, a steel box for telescopic sight, also various stores as shown in packing diagram A.

Half the limbers per battery will be fitted with loops for kicking straps.

Wagon, Ammunition, B.L., 12-pr., 6 cwt.

(*Plate VI.*)

The wagon consists of a steel frame, a hollow box perch, and an ammunition box, mounted on a 2nd Class axletree, and field wheels.

The frame consists of two flanged sides connected by a rear plate and diagonal stays. A platform and a footboard are fitted to the sides in the front, and at the rear, brackets are fitted for a wood shelf to facilitate the setting of fuzes.

The perch, which is connected to the frame, is made of steel plate; it is fitted with a perch eye (No. 7), with movable steel, locking plates, and a loop for the attachment of the drag shoe (No. 7) and chain (No. 18). The drag shoe, when not in use, is carried on the top of the perch, secured by a leather strap.

The ammunition box is generally similar to that described for the limber, but differs in the arrangement of the internal fittings. Two cartouches, each holding 24 cartridges, a small holdall containing gun fittings, and three fuze boxes (No. 20), are carried in suitable compartments.

The axletree (No. 99) is of weldless steel tube with 2nd Class arms. The wheels are the No. 35 "C," the same as for the carriage and limber.

The wagons are fitted to carry various stores, as shown in diagram A.

Dimensions, &c.

	Carriage and Limber.	Wagon and Limber.
Height to axis of gun	3 ft. 4 in.	—
Length of carriage and limber with gun	24 „ 9 „	—
Length of carriage and limber without gun ..	23 „ 1 „	—
Length of wagon and limber	—	21 ft. 8 in.
Length of axletree	6 „ 2 „	6 „ 2 „
Length between axletrees	9 „ 0 „	7 „ 3 „
Greatest projection beyond track of wheels	0 „ 6 „	0 „ 6 „
Maximum width	6 „ 2 „	6 „ 2 „
Wheels track	5 „ 2 „	5 „ 2 „
Wheels diameter	5 „ 0 „	5 „ 0 „
Space required to turn in	33 „ 0 „	30 „ 0 „
Angle of trail	28½°	—
Angle of lock	62°	60°
Upsetting angle	32°	33°
Elevation, maximum	16°	—
Depression	8°	—
Tonnage for shipment	*5·633 tons	6·08 tons
Tonnage for transport in boats	11·59 „	11·32 „
Rectangular space occupied in boats	14′ 10″ × 6′ 3″ × 5′	14′ 6″ × 6′ 3″ × 5′

* Without gun.

Weights (approximate).

(Packed.)

	Carriage and Limber.	Wagon and Limber.
	cwt. qr. lb.	cwt. qr. lb.
Carriage and limber, with gun	31 0 2	—
Wagon „	—	31 0 22
Carriage and limber weight on two fore wheels ..	16 0 8	—
Carriage and limber „ „ hind „ ..	14 3 22	—
Wagon and limber „ „ fore „ ..	—	16 0 4
Wagon and limber „ „ hind „ ..	—	15 0 18
Carriage (trail on ground)	15 3 24	—
Limber carriage	15 0 6	15 0 6
Limber wagon		
Wagon (perch on ground)	—	16 0 16
Weight at end of pole (limbers)	0 1 2	0 1 2
Pressure of perch on ground (wagon) ..	—·	1 2 0
„ trail „ (carriage) ..	1 1 0	—
Wheel, No. 35..	1 3 4	1 3 4

Wagon, Forge, R.A., Mark I*.

Limbers, Wagon, Forge, R.A., Mark I**.

These wagons and limbers are the Mark I pattern, converted to conform, as far as possible, to the Mark II pattern (*see* below). Runners and guides are fitted to the tailboard and bottom of the wagon to carry either the Mark IV R.A. field or the Mark II G.S. forge. The wagon is fitted with four under boxes, and two lantern boxes (one for two distinguishing lanterns† and one for two folding lanterns) on top, and four bale hoops for a canvas cover.

The limber for this wagon is the Mark I pattern, fitted for pole draught, and with the limber box altered internally to conform to the limber box of the Mark II* limber.

The pole draught will be the same as that for the carriage and wagon limber.

The wheels are 2nd Class, "C," No. 36.

Dimensions, &c.

	ft.	in.
Total length, with pole	23	1
Maximum width	6	4
Length between axles	7	7¼
Wheels { track	5	2
Wheels { diameter	5	0
Space required to turn in	32	0
Angle of lock	58°	
Upsetting angle, packed	35°	
Rectangular space occupied in boats, 14 ft. 2 in. × 6 ft. 4 in.		
Tonnage { for shipment	6·83 tons.	
Tonnage { „ transport in boats ..	17 „	

Weights (approximate).

(Packed, including personal equipment.)

	cwt.	qr.	lb.
Wagon and limber	44	3	0
Wagon and limber .. { weight on two fore wheels	17	2	0
Wagon and limber .. { „ „ hind „	27	1	0
Wagon (perch on ground)	28	2	18
Limber	16	0	19
Weight at end of pole	0	1	6
Pressure of perch on ground	3	2	0

Wagon, Forge, R.A., Mark II.

Limber, Wagon, Forge, R.A., Mark II*.

The wagon consists of a frame of angle iron, a perch, and an axle tree, built upon the box girder principle, and two field wheels.

The perch is formed of two pieces of "channel" iron, connected by collar bolts, top and bottom plates, and a perch eye which is riveted between them at the front; it is fitted to carry an anvil and

† Distinguishing lanterns are carried with ammunition columns only.

block on the top, and a drag shoe and chain on the "off" side. On the top of the perch two holes are drilled to receive a vice.

The frame of the wagon is boarded over, and fitted with side boards and movable head and tailboards to form the body of the wagon.

The body is divided into two compartments by a cross partition. The hind compartment is covered with a lid which is hinged to the partition; the front compartment is covered by two removable cutting boards and a narrow flap, which is hinged to the cover of the hind compartment. Two tool chests (one for smith's tools and one for wheeler's tools) are carried in the front compartments, and either a Mark IV, R.A., field forge, or a Mark II, G.S., field forge, in the rear compartment.

The wagon is fitted with four under boxes, two lantern boxes (one for two distinguishing† lanterns and one for two folding lanterns) on top, and four bale hoops for a canvas cover.

The limber for this wagon is the Mark II pattern, fitted for pole draught, and with a limber box arranged internally for cans, boxes, and tins to carry the oil, soap, dubbing, &c., allowed for this equipment.

The pole draught is the same as that for the carriage and ammunition wagon limber.

The wheels are 2nd Class, "C," No. 36.

Dimensions, &c.

	ft.	in.
Total length, with pole	23	3
Maximum width	6	4
Length between axles	7	9
Wheels { track	5	2
Wheels { diameter	5	0
Space required to turn in	32	0
Angle of lock	58°	
Rectangular space occupied in boats, 14 ft. 5 in. × 6 ft. 4 in.		
Upsetting angle, packed	35°	
Tonnage { for shipment	7·21 tons	
Tonnage { „ transport	16·93 „	

Weights (approximate).

(Packed, including personal equipment)

	cwt.	qr.	lb.
Wagon and limber	44	2	0
Wagon and limber { weight on two fore wheels	17	1	14
Wagon and limber { „ „ hind „	27	0	14
Wagon (perch on ground)	28	2	4
Limber	15	3	24
Weight at end of pole	0	1	0
Pressure of perch on ground	3	2	0

Wagon, Store, R.A., Mark I.

Limber, Wagon, Store, R.A., Mark I*.

This wagon is similar to the forge wagon, Mark II, but the body is divided into three compartments, which are covered with lids. The front and centre compartments are fitted to carry stores, and the rear

† Distinguishing lanterns are carried in the ammunition column only.

compartment, a stationery box, the front of which can be let down on the tailboard (when the latter is supported by its chains) to serve as a writing desk.

The wagon is fitted on the top to carry a lantern box for two folding lanterns, a chest of collarmaker's tools, a case of butchery implements, picketing ropes, luff tackle, a camp stool, reaping hooks, and spare swingletrees.

The limber is the same as that described for the Mark II forge wagon, but the limber box differs in its internal fittings.

The wheels are 2nd Class, "C," No. 36.

Dimensions, &c.

	ft.	in.
Total length, with pole	23	2
Maximum width	6	4
Length between axis	7	10
Wheels — track	5	2
Wheels — diameter	5	0
Space required to turn in	32	6
Angle of lock	58°	
Upsetting angle, packed	35°	
Rectangular space occupied in boats, 14 ft. 2½ in. × 6 ft. 4 in.		
Tonnage — for shipment	6·82 tons.	
Tonnage — „ transport in boats	16·68 „	

Weights (approximate).

(Packed, including personal equipment.)

	cwt.	qr.	lb.
Wagon and limber	39	1	2
Wagon and limber — weight on two fore wheels	15	2	3
Wagon and limber — „ „ hind „	23	3	9
Wagon (perch on ground)	24	2	19
Limber	14	2	21
Weight at end of pole	0	1	0
Pressure of perch on ground	2	2	3

Wagon, Store, R.A., Mark II.

Limber, Wagon, Store, R.A., Mark II*.

This wagon is similar to the forge wagon Mark III, but the body is fitted with four wooden boxes, secured by nib irons and thumb screws; the three front boxes are for carrying stores, and the rear box for stationery.

The perch is formed of steel plate bent so as to form a tapering box girder, and is fitted with a perch eye. Two propsticks are fitted on the underside.

The stores carried on the top of the wagon are the same as those for the Mark I.

The limber is generally similar to the carriage limber, but is fitted with a special box for stores.

The wheels are 2nd Class, "C," No. 36.

Dimensions, &c.

	ft.	in
Total length, with pole	22	9
Maximum width	6	2
Length between axles	7	$9\frac{3}{4}$
Wheels { track	5	2
Wheels { diameter	5	0
Space required to turn in	29	4
Angle of lock	60°	
Upsetting angle, packed	$29\frac{1}{2}$°	
Rectangular space occupied in boats, 14 ft. 2 in. × 6 ft. 2 in.		
Tonnage { for shipment	8·127 tons.	
Tonnage { ,, transport in boats	16·089 ,,	

Weights (approximate.)

(Packed, including personal equipment).

	cwt.	qr.	lb.
Wagon and limber	35	2	0
Wagon and limber { weight on two fore wheels	15	2	0
Wagon and limber { ,, ,, hind ,,	20	0	0
Wagon (perch on ground)	21	1	0
Limber	14	1	0
Weight at end of pole	0	1	11
Pressure of perch on ground	1	3	17

Wagon, Ammunition and Store, R.A., Mark II*.

(Plate VII.)

The body of this wagon consists of a framework formed by two sides, *a*, and two summers mortised into a front and rear carbed, *b*. This framework is strengthened by plates riveted on the inside; it is housed and bolted to a front bolster, *c*, a cross bar, *d*, and a rear bolster, *e*. In front and rear of the front bolster, front and rear wheel bolsters, *f f*, are bolted to the summers, and to these three the upper wheel plate, *g*, is attached. The front bolster is shod with a friction plate, and is plated on the sides.

The body is supported over the hind axle upon two side stays of T-iron and a cross stay of round iron. Each side stay rests in an axle block of oak upon the shoulder of the axletree, where it is secured by axletree staples, by a clip plate, and by the end of the cross stay, which latter serves as a coupling plate.

The frame is boarded over to form the bottom of the wagon, and movable sides, A, headboard, B, and tailboard, C, are fitted to it.

A locker is formed in front of the wagon body by a sliding partition. The lid of the locker is fitted with a raised box and driving seat, *k*, a back board, *l*, being hinged to it, and a footboard, *m*, to the head board of the wagon. A small locker *n* is formed between the summers underneath the rear of the wagon.

These wagons are now fitted with cranked guard irons, and the driver's seat is made slightly higher for convenience in driving with long reins. The footboard is increased in length and width, and fitted with a long toe piece, and further supported by iron stays fitted to its under side and to the front carbed.

The fore carriage of the wagon is formed of four futchels, *o*, housed in and bolted to a splinter-bar, *p*, and a cross-bar, *q*. An upper bolster, *r*, is bolted over, and an under bolster, *s*, beneath the centre of the futchels. A wheel plate is attached to the upper bolster, to the cross-bar, and to a small wheel bolster, *t*, placed in front. The upper

bolster is shod with a friction plate, and both it and the lower bolster are strengthened by plates.

The frame of the fore carriage is supported over its axle in the same manner as the body over the hind axle.

The wagon is fitted for pole draught, which consists of a pole, bar supporting pole, two swingletrees, and two draught chains.

The body and fore carriage are connected by a main pin, which passes through bolster plates in the main bolsters, and is keyed beneath.

The footboard is of elm, the other boarding of yellow deal, and the remainder of the woodwork of the wagon of oak.

The fore wheels are 3 ft. 4 in. in diameter, the hind 5 ft. The axles are 2nd Class.

The wheels first issued with the wagons were—

fore, 2nd Class, B, No. 33
hind, „ „ „ „ 32
} with wood naves.

Later issues of the wagons have been supplied with—

fore, 2nd Class, B, No. 28
hind, „ „ C, Nos. 35*a* or 39
} with metal naves.

Nos. 28 and 35*a* wheels will be issued in future and will replace existing Nos. 33 and 39 wheels as they become unserviceable.

The wagon is fitted to carry a spare fore wheel, intrenching tools, and swords, and a drag shoe with chain, &c. Staples are fitted on the head board to carry the picketing gear in a bag, secured by straps. A locking plate, *u*, is attached beneath the frame to prevent the fore wheel injuring the latter in wheeling on rough ground. Clip plates are attached to the floor (at the rear) of the wagon, to take a spare wheel arm, which will be supplied with such wagons as are allotted for carrying spare gun wheels.

The following articles belong to the wagon, namely, five bale hoops, *x*, a waterproof canvas cover with the lashing rope, bar stay, three lashing ropes to secure the spare wheel, drag shoe with chain, and half-round grease tin.

The drag shoe is attached to a ram's horn hook fixed on the near side. The shoe, when not in use, is carried in a bracket on the side and secured by straps. In the plate, the old manner of carrying it is shown.

The bale hoops are of ash, fitted with leather stops, and numbered from one upwards, commencing with the front hoop, a corresponding number being placed upon the wagon side at the upper staple for the bale hoop. The front hoop has also the register number of the wagon painted upon it.

The canvas cover is waterproofed, and has the register number of the wagon painted upon it.

The bar stay is of ash to fit from side to side, and keep the sides from spreading out when the wagon is packed and the tailboard down.

The extreme load is two tons.

Certain wagons of this description when used for carrying baggage or tents will be provided with raves on each side and a "cover, wagon, G.S., Mark IV."

Weights, &c.

Weight	1 ton 0 cwt. 3 qr.
Tonnage { for shipment	4·659 tons.
Tonnage { „ transport in boats	12·839 „
Rectangular space occupied in boats	11 ft. 4 in. × 6 ft. 3 in.
Upsetting angle	30°
Angle of lock	103°
Space required to turn in	23 ft. 7 in.

Note.—The stores carried in this wagon are laid down in the Tables of Equipment.

General Instructions for Care and Preservation.*

(*Based on Instructions contained in "Regulations for Magazines and the Preservation of Artillery Matériel."*)

All the working parts and frictional surfaces should be kept clean and free from clotted oil and dirt. All oil holes should be kept clear. In cleaning the bright parts care should be taken to avoid the use of coarse grinding materials, such as sand, emery, files, &c., which unnecessarily wear away the surfaces, and give too much play to the various parts. This particularly applies to the elevating spindle, screw and pin, and various bearings. The joints of hasps, turnbuckles, and ammunition box hinges should be oiled occasionally.

All bolts, screws, and nuts should be kept tightly screwed up, but before inserting them the threads should be oiled. Any bolts, nuts, rivets, screws, split keys, hasps, turnbuckles, or hinges that are damaged or deficient should be repaired or replaced at once.

In handling gear care should be taken not to indent screws, pinions, spindles, &c. All indents should be neatly removed.

Before repainting the equipment, care should be taken that it is put in proper repair; that all blistered paint, dirt, and grease are thoroughly removed.

The equipment will be painted with lead-colour paint, which is issued prepared ready for use; care must be taken that it is applied thinly and evenly over the surface, and that elevating screws and bright parts are avoided. Before the first coat is applied the surface should be quite dry, and the second coat should not be applied until the first has hardened. If the paint is found to be too thick to flow evenly from the brush, it should be thinned with the best spirits of turpentine.

On completion of the painting the lettering will be done with white paint, in accordance with Regulations.

Carriages.

The elevation pinion and handle should be kept securely keyed up to the spindle and made to work freely. The elevating screw and nut should work freely, and the stop nut be properly keyed up. When the elevating gear works stiffly, and oil fails to set it free, it should all be removed from the carriage, cleaned, examined, and any necessary adjustments made.

Great care must be taken that the elevating gear, when removed from the carriage, is correctly replaced.

The drag chains may require adjusting occasionally, and new steel soles riveted on the shoes; the chains of firing brakes, if broken, can be easily repaired.

The traversing handspikes, if broken, can, in most instances, be repaired temporarily by binding them up tightly with wire or waxed cord, until new ones are obtained.

Limbers and Ammunition Wagons.

If the poles become rough and splintered on their sides they should be smoothed and painted.

---

* For detailed instructions as to method of carrying out repairs &c., *see* Handbook for Military Artificers.

If the draught hooks on the end of futchels for swingletrees become twisted, they can be adjusted without removal, but should be "warmed" first. The limber hook keys should be kept straight and properly attached.

It is most important to keep the bolts securing the ammunition boxes on the limbers and wagons properly nutted up.

The limbers must always be parked with the pole on the ground, and great care must be taken in limbering up (when the horses are not harnessed in) that the pole is not allowed to rise above its horizontal position.

Ammunition Boxes.

When box locks are not working properly they should be removed, taken to pieces, and the necessary adjustments made. It is frequently necessary to adjust the points of the bolts of locks and make new striking plates. When it is found that the points of bolts and striking plates are cutting one another, they should be adjusted and slightly oiled. When the T handles are broken, bent, or loose, they should be made new or adjusted at once.

The steel binding round the lids should be kept straight and properly secured so as to exclude water from the boxes. Damaged canvas covers or leather fixtures, which cannot be repaired, should be replaced by new ones.

The internal fittings of the boxes are subject to much damage, but most of them are of a simple character and can be readily repaired or made new, such as the fittings on the lids, pieces securing projectiles, trays, partitions, &c. The rear of limber boxes are liable to damage from the trail eye in limbering up, and to put in a new rear entails much labour, therefore extemporary repairs may be resorted to provided the box is made sound and serviceable. A simple split in the wood (a sun shake) should be stopped with paint and putty.

Guard irons are liable to get too much play in their sockets; to remedy this the feet and the inside of the sockets should be painted occasionally.

Wagons, Ammunition and Store.

These wagons are used for rough work, consequently many breakages occur from time to time; in fact there is hardly any part that may not be broken or damaged. All repairs can be done by battery artificers. It is important to keep the axletree clips tightly nutted up, and the front axletrees blocked, so that the wheels may lock under.

Wheels.

Felloes slightly split can, in some cases, be strongly repaired by the insertion of screws. Slip spokes or felloes may be inserted for unserviceable ones. When the joints of felloes have shifted, and tires become twisted on the felloes, they should be adjusted on an anvil with a flatter and sledge hammer.

In No. 35 and 35A wheel the rivets securing the metal collar to the front flange if broken should be replaced at once.

If the feet of the spokes shrink (in No. 35 and 35A wheel), thereby becoming loose in the flanges, the metal nut on the face of the nave should be screwed up tightly with the spanner No. 93 provided for the purpose. Care must be taken that the nut is left in such a position that one of the teeth of the racket engages the spring catch, and also that no dirt is allowed to collect under the catch and prevent its coming down with the ratchet.

The spring catch may be found to lose its set, and should be removed and reset when required. The point is liable to wear, and when this occurs to such an extent as to prevent the catch having a proper bearing in the ratchet the catch should be replaced.

Wheels acquiring too much play on the axletree arm should have a leather or steel washer placed on the axle at the outer end of the pipe box, between it and the linch-pin washer.

The proper greasing of the wheels is of the greatest importance, and officers of batteries should personally see that the pipe boxes of wheels and axles of vehicles are kept free from dirt and grit, and properly greased.

When vehicles are in constant use the wheels and axles should be greased periodically, and in cases of vehicles in store, the wheels and axles should be kept greased, and should be re-greased before being used. The points of axletree arms will be painted in station equipment, but kept bright in "peace equipment."

To grease the axle, remove the wheel and carefully clean all the old grease off the axle and from the inside of the pipe box. Then smear the inside of the pipe box and outside of the axle with fresh grease and replace the wheel.

It is most important that the old grease should be removed before applying fresh, as the old grease contains small particles of metal and sand, and soon wears the pipe boxes. The metal nave must be kept painted, and on no account polished.

Projectiles.

(*Plates VIII, IX, and X.*)

Description.	Diameter.		Length.	Bursting charge.		Weight filled and fuzed.
	Body.	Band.		Nature.	Weight.	
	inches.	inches.	inches.		oz.	lb. oz.
Shell, Shrapnel, Mark II } „ III }	2·98	3·09	8·349	R.F.G.²	1¼	12 8
Shot, case „ IV	2·97	3·09	8·5*	—	—	12 14

* Length over handles .. 8·9 in.

Shrapnel Shell.

(*Plates VIII and IX*).

Mark II.—The body of the shell is of forged steel. Close to the base a groove is turned; three ridges project on the groove, and six

axial chisel marks are cut across the ridges to prevent the driving band turning on the shell. The driving band is of copper, and is pressed into the groove round the shell. The top of the body is recessed to receive the head.

The head of the shell is made of charcoal or Bessemer steel, struck with a radius of $1\frac{1}{2}$ diameters, and is truncated and screwed to receive a gunmetal socket; the interior of the socket is bored and screwed to the G.S. taper.

The head is fitted with a block of wood and felt washer; and is attached to the body by screws and pins. A steel disc is placed in the head, over the balls.

In the base of the shell is fitted a sheet-iron (tinned) cup to contain the bursting charge. A steel disc rests on the shoulder in the bottom of the shell to support the metal balls; into the disc screws the lower end of the central tube; its upper end being secured, after passing through the socket, by a gunmetal nut. The top of the tube is screwed internally to receive a primer.

The shell is lined with brown paper. A steel wire cage, with steel disc attached, is inserted in the shell to contain the metal balls. The cage consists of 12 vertical wires soldered in the slots round the circumference of the steel disc; a piece of flattened iron wire is wound round the outside of the vertical wires in the form of a spiral.

The cage contains 156 mixed metal balls, 35 to lb., the interstices being filled with resin (any deficiency in the weight of the shell is made up with buck shot).

The general form of the shell is shown on the Plate.

Mark III differs from Mark II in having the metal balls contained in a perforated tin cylinder, and a stronger steel disc over the chamber which contains the bursting charge. Some *Mark I* shells have had their contents altered to render them practically identical with Mark III, such shell will be known as *Mark I**.

The shell should only be carried fuzed—

(*a*) On active service, when in the judgment of the battery commander, it is desirable to be prepared for immediate action;

(*b*) At practice camps, when necessary for the rehearsal of (*a*).

It must be remembered that the fuzes when once taken out of their cylinders gradually deteriorate; shell should therefore not be fuzed earlier than is necessary.

When the fuze is placed in the shell in accordance with (*a*) and (*b*) above, the beckets of the safety pins should be looped over the nut of the fuze. This is to prevent the possibility of the beckets being rubbed between the lid and the ammunition box, and thus becoming liable to break when the safety pins are pulled.

Note.—On an emergency, a 15-pr. B.L. shell (*not charge*) may be fired from a 12-pr. B.L. 6 cwt. gun (75/12/5877). The M.V. with a 15-pr. shell is 1,478 f.s., and the pressure per square inch 16·075 tons.

Case Shot.

(*Plate X.*)

The body of the shot is made of XXS tin, in one piece, lap jointed and soldered, the lower end being corrugated in the form of a screw, to receive the base. The base is made of iron, and is fitted with a copper driving band, and a handle; the upper portion of the base is

screwed into the lower end of the body and lightly soldered. The body has an inside lining of two steel segments, and contains 290 mixed metal balls (31 per lb.), the interstices being filled with a mixture of equal quantities of clay and sand. The top is closed by a disc of iron or mild steel.

The action of the shot is as follows:—On firing, the base takes the rifling and unscrews from the body, thus ensuring the shot breaking up in the gun.

Fixing Plugs* and Fuzes.

All shell for Field Service are issued filled; when, however, it is necessary to remove fuzes or plugs, they will be slightly lubricated before being replaced in the shell. At home stations a mixture of Mark III luting and mineral jelly, in equal proportions of each by weight, will be used. At stations abroad black grease will be used.

Distinguishing Marks.

The bodies of shrapnel shell are painted black and the fuze hole plugs red. They have also a red tip, 1 in. deep, and being made of steel, a white band, $\frac{1}{2}$ in. wide, is painted immediately below the red tip. "F.S." will be stamped on base of forged steel projectiles.

Filled shell will also have a red band immediately below the white band, and will be marked in red letters, $\frac{1}{4}$ in. long, as follows:—

(*a*) The monogram of the station.

(*b*) The date of filling.

Projectiles which are to be used for practice only, will be marked with a yellow band, $\frac{1}{2}$ inch wide, round the body.

FUZE, TIME, AND PERCUSSION, No. 56, MARK IV.

(*Plate XI.*)

The fuze consists of the following parts, viz.:—Body, detonator plug with detonator, percussion pellet, spiral spring, base plug, safety pellet, brass ball, composition ring, dome, brass washer, cap, two safety pins, and two leather washers.

---

* In cases where plugs are found to be tightly jammed in the shells, the turnscrew, which is fixed to the ammunition boxes, should be used to start the plugs. Any attempt to extract such plugs solely by means of the "key, fuze, universal," may result in the latter being damaged.

The *body* is made of gunmetal, screwed at the lower end to G.S. fuze hole gauge. It is bored from the bottom to receive a percussion pellet and base plug. Two holes are bored beyond the recess for percussion pellet, one for the detonator plug, the other for the safety pellet.

The *detonator plug* is made of gunmetal, screwed on the outside, and bored to receive a detonator.

The *detonator* is made of sheet copper, charged with 3½ grains of detonating composition; the centre hole in the bottom is covered inside with a brass disc. A tinfoil disc goes on the surface of the composition, and over it a copper disc with four perforations, which is secured by turning over the lugs on the edge of the detonator body. The hole bored for the detonator plug is continued above it to form a small magazine filled with F.G. powder. In the top of the body is bored a recess to contain a perforated pellet of pressed pistol powder, which communicates with the magazine by a hole, bored at right angles to the axis of the fuze. The stem on the body is screwed on top to take the cap, two grooves being cut in the top end of stem to receive the feathers on the brass washer. A groove is cut in the top face of body, close to the stem, and half way round it, and a gas-escape hole bored obliquely through the body into the groove. A small tablet of fine white paper is secured with shellac to the body of the fuze over the perforated powder pellet, and over it, two washers of fine white paper and calf-skin are secured with shellac, a hole being cut through the washers and tablet immediately over the powder pellet.

The *percussion pellet* is made of gunmetal, and has a slot cut in the side for the safety pellet and ball to fall into when set in action. A hole is made transversely through the pellet into which fits the brass retaining bolt, held in position by a brass spiral spring. The pellet contains a powder charge of F.G. powder. A small set screw, in the wall of the recessed interior of the body, fits into a slot cut in the percussion pellet to prevent it from turning in flight. A spiral spring, made of brass wire, is placed between the percussion pellet and detonator plug.

The *base plug* is made of gunmetal, with a conical hole bored in it, and closed at the bottom by a shalloon disc and brass washer spun in; it contains a perforated pellet of pressed powder, secured by a brass washer spun over on top.

The *safety pellet* is made of brass, and has a slot cut in the side to clear the brass ball. It is inserted in the body and suspended by a thin copper wire passing through holes in the fuze and pellet; the ends of the holes are closed by small lead plugs. A hole is also bored in the upper part of the pellet and body of fuze for the safety pin to pass through.

The *composition ring* is made of gunmetal, having a chamber on one side, and three projections on the inside to keep it concentric with the stem of the body. The chamber is fitted with a hammer containing a steel needle, which is suspended by a copper wire over a patch of detonating composition. A safety pin also passes through the hammer and chamber. The ring has a groove on the underside, filled with composition, and connected with the chamber by a lighting hole. The outside of the ring is graduated from 0 to 18, each division being subdivided into halves and quarters, with a broad arrow at the point where the groove is interrupted by a bridge soldered in.

The *dome* is made of sheet brass.

The *washer* is made of sheet brass, with two feathers which fit into featherways cut in the top of the stem. When screwing up the cap, the washer remains stationary, thus preventing the dome from turning and altering the setting of the fuze.

The *cap* is made of gunmetal, hexagonal in form, and screws on the stem of the body.

The fuze is stamped T on the composition ring close to the time safety pin, and P on the body close to the percussion pin.

The fuze should be set *before* the safety pins are withdrawn.

To set the time arrangement, the cap is loosened with the "key, fuze, universal," and the ring moved round until the graduation ordered is exactly in line with the arrow on the body; the fuze is then clamped by screwing down the cap as tightly as possible, care being taken that the ring and dome have even bearings.

If the fuze is required to act as a percussion fuze only, the P pin should be withdrawn and the T pin left in position; otherwise, both pins should be withdrawn, but this should not be done till the moment of loading.

Action.—On discharge, if the time safety pin has been withdrawn, the hammer sets back, shearing the suspending wire, and igniting the detonator and the time ring, which burns until it comes over the pellet and so flashes down through the radial magazine, detonator pellet, and base plug, and into the shell.

If the percussion pin has been withdrawn, the safety pellet sets back, shearing the suspending wire, and the brass ball falls down into the space over the safety pellet. The centrifugal bolt, owing to the rotation of the shell is withdrawn, the percussion pellet is free to move forward on impact, and ignite the detonator, which flashes through the percussion pellet and base plug into the shell.

CHARGES.

(*Plate XII.*)

Weight.	Nature.	Mark.	
$12\frac{7}{16}$ oz.	Cordite, size 5.	I.	Service.
1 lb.	Blank, L.G.	I.	Saluting.

The service cartridge consists of a bundle of $12\frac{7}{16}$ oz. of size 5 cordite, length 5·5-in., tied in three places with silk twist, and enclosed in a shalloon bag.

Each end of the cartridge is primed with 4 drams of R.F.G.[2] powder, secured between two discs of shalloon.

Length of cartridge	6·2 in.
Diameter of cartridge	2·2 „

The saluting charge is 1 lb. blank, L.G., in a cartridge of No. 1 silk cloth, choked with silk twist, hooped with two silk braids, and with a silk braid loop attached to the bottom for removing it from the gun, if necessary.

Length	4·7 in.
Diameter	3·0 „

Drill Cartridge.

The cartridge is made of a block of wood, covered with raw hide. The cartridge is weighted by means of a piece of lead in the centre.

Length	6·2 in.
Diameter..	2·2 ,,

Note.—Batteries practising either with blank cartridges or projectiles should leave their drill cartridges in camp or barracks.

The tampeon is not to be placed in the gun except in the gun park.

TUBES.

T FRICTION TUBE, MARKS II AND III

(*Plates XIII and XIV.*)

Mark II.—The form and general dimensions of the tube are shown on the plate, and consist of the following principal parts:—Body (*a*), head (*b*), ball (*d*), plug (*e*), friction wire (*f*).

The head is of gunmetal, the body of solid-drawn brass, the ball of soft copper, and the friction bar of half-round copper wire, twisted into a round bar, with a loop at one end and the other roughened. A hole in the side of the head of the tube over the friction wire is charged with about 2 grains of detonating composition, in the form of a paste, laid over the roughened part of the friction wire. A gut skin disc (*g*) is placed over the composition, and a shellaced cork plug (*h*) inserted over the disc, the hole being filled up flush with shellac cement. The body is charged with 8 grains of pistol powder, and is closed with a shellaced cork plug (*i*) covered with shellac cement.

A brass pin (*c*) is inserted to prevent the body becoming unscrewed. The upper part of the body has a central perforation, which is enlarged in its lower part into a conical recess. The ball (*d*) is placed in this recess, and is retained therein by a screwed plug (*e*) pierced by three fire holes.

On the withdrawal of the friction bar the detonating composition is ignited, and the flash, passing down the perforation in the head and through the plug, fires the powder charge. The ball is driven upwards by the explosion and seals the tube. This, together with the mode in which the tube is held in the special vent employed with it, prevents the escape of gas.

The body is lacquered inside and outside.

Mark III.—This tube differs from Mark II principally in the method of fixing the friction bar, which is suspended by a "shearing wire" at the base of the loop.

Total length of both tubes 1·9 inch.

The tubes are issued 10 in a square tin box. Both the top and bottom of the box are removable, being secured by soldered bands, and the tubes are so arranged that five may be withdrawn from the top and five from the bottom.

Notes.

Tubes, after firing, are to be returned to Woolwich to be repaired and refilled; they should be immersed in mineral oil within 24 hours

after firing, for which purpose ½ gallon of oil per 100 tubes—of which 2 oz. ($\frac{1}{10}$ pint) would be used up in the treatment—is allowed.

In the event of a tube failing to ignite a charge, care should be taken in extracting the fired tube not to stand directly in rear of the gun, as the gas generated will cause the tube to fly out with some violence so soon as the T head is clear of the recess in the vent.

The vent channel sometimes becomes choked with residue from the cartridge. When this occurs the taper portion should be cleared with a "rimer, vent, T," sufficiently to allow of the insertion of a tube, which, when fired, will remove the rest of the obstruction.

A tube is not to be inserted in the vent till the breech is properly closed.

T Friction Tube, Drill, Mark I.

(*Plate XIV.*)

The drill tube is made of hardened steel, of the same external shape as the Service tube. The head is grooved and fitted with a hardened steel spring, which is attached by a screw from the under side of the head. The end of the spring is bent down to nearly meet the bottom of the groove, which is raised to form a jaw through which the hook of the lanyard can be drawn by a pull of about 50 lb.

Total length of tube 1·9 inch.

Range Table for 12-pr. B.L. Gun of 6 cwt.

Based on Practice of 10.12.95.

Charge, { weight, 12 7/16 oz. / gravimetric density, 90·05 / 0·307 / nature, cordite, size 5.

Projectile, { nature, Shrapnel shell. / weight, 12½ lb.

Muzzle velocity, 1,523 f.s.

Nature of mounting, travelling, field.

Jump, + 2 minutes.

Remaining velocity.	5 minutes' elevation or deflection alters point of impact: Range.	5 minutes' elevation or deflection alters point of impact: Laterally or vertically.	Deflection for drift (Telescopic sight).	Slope of descent.	Elevation.	Range.	Fuze scale for time and percussion fuze, Mark IV.	50 per cent. of rounds should fall in: Length.	Breadth.	Height.	Time of flight.
f.s.	yds.	yds.	° ′	1 in	° ′	yds.		yds.	yds.	yds.	secs.
1477	50	0·14	...	343	−0 18	100		17	0·14	0·05	0·24
1432	50	0·29	...	171	−0 8	200		17	0·14	0·11	0·48
1390	50	0·13	0 1	118	0 2	300	1	17	0·14	0·16	0·72
1348	50	0·58	0 1	88	0 10	400	1¼	17	0·14	0·21	0·96
1309	50	0·72	0 1	71	0 19	500	1½	17	0·14	0·25	1·20
1270	49	0·87	0 1	59	0 28	600	2¼	18	0·15	0·32	1·45
1235	49	1·01	0 2	49	0 38	700	2¾	18	0·16	0·40	1·70
1200	49	1·16	0 2	43	0 49	800	3	19	0·18	0·47	1·95
1168	48	1·31	0 2	37	0 59	900	3½	19	0·20	0·56	2·20
1137	48	1·45	0 3	33	1 09	1000	3¾	20	0·24	0·64	2·45
1108	47	1·60	0 3	29	1 19	1100	4¼	20	0·28	0·74	2·71
1080	46	1·74	0 3	26	1 29	1200	4¾	20	0·33	0·85	2·98
1059	45	1·89	0 3	23	1 40	1300	5	21	0·38	0·97	3·24
1033	44	2·03	0 4	21	1 51	1400	5½	21	0·44	1·09	3·51
1022	43	2·18	0 4	19	2 03	1500	6	22	0·50	1·22	3·78
1006	41	2·32	0 4	17	2 15	1600	6½	22	0·57	1·35	4·05
993	40	2·47	0 5	16	2 28	1700	6¾	23	0·64	1·51	4·34
975	39	2·61	0 5	14	2 41	1800	7¼	23	0·72	1·66	4·63
961	37	2·76	0 5	13	2 54	1900	7¾	24	0·81	1·82	4·92
947	36	2·91	0 6	12	3 08	2000	8¼	24	0·90	2·00	5·22
933	35	3·05	0 6	11	3 22	2100	8¾	25	1·00	2·23	5·52
920	34	3·20	0 6	11	3 36	2200	9¼	26	1·11	2·46	5·83
907	33	3·34	0 7	10	3 51	2300	9¾	27	1·22	2·70	6·14
894	32	3·49	0 7	9·2	4 06	2400	10¼	28	1·34	3·03	6·45
881	31	3·63	0 8	8·7	4 22	2500	10¾	29	1·45	3·36	6·78
869	30	3·78	0 8	8·1	4 39	2600	11¼	30	1·58	3·70	7·11
857	29	3·92	0 9	7·6	4 56	2700	11¾	32	1·69	4·30	7·46
843	29	4·07	0 9	7·1	5 14	2800	12¼	35	1·66	4·93	7·81
834	28	4·21	0 10	6·7	5 32	2900	13	39	1·62	6·75	8·16
823	28	4·36	0 10	6·3	5 50	3000	13½	54	1·57	3·57	8·52
813	27	4·51	0 11	6·0	6 09	3100	14	60	1·52	10·0	8·89
803	26	4·65	0 11	5·6	6 28	3200	14¾	67	1·46	11·9	9·27
793	26	4·80	0 12	5·3	6 48	3300	15¼	73	1·40	13·7	9·66
783	25	4·94	0 12	5·0	7 09	3400	15¾	78	1·35	15·6	10·06
773	24	5·09	0 13	4·7	7 30	3500	16¼	82	1·30	17·2	10·47
763	24	5·23	0 13	4·5	7 51	3600	17	86	1·26	18·8	10·88
753	23	5·38	0 14	4·3	8 13	3700	17¾	88	1·22	20·4	11·32
744	22	5·52	0 14	4·1	8 36	3800	...	90	1·19	21·7	11·77
735	22	5·67	0 15	3·8	9 00	3900	...	91	1·16	23·0	12·22
726	21	5·81	0 16	3·6	9 25	4000	...	92	1·19	24·4	12·68
717	21	5·96	0 16	3·5	9 50	4100	...	93	1·23	26·2	13·16
708	20	6·11	0 17	3·3	10 15	4200	...	93	1·29	28·1	13 61
699	20	6·25	0 17	3·2	10 41	4300	...	94	1·37	29·9	14·13
690	19	6·40	0 18	3·0	11 8	4400	...	95	1·47	31·7	14·62
681	19	6·54	0 19	2·9	11 34	4500	...	95	1·57	33·4	15·12
672	19	6·69	0 20	2·8	12 01	4600	...	96	1·69	35·1	15·62
664	18	6·83	0 20	2·6	12 28	4700	...	96	1·81	36·9	16·12
656	18	6 98	0 21	2·5	12 56	4800	...	97	1·93	38·8	16·62
648	18	7·13	0 22	2·4	13 24	4900	...	97	2·05	40·7	17·14
640	17	7·27	0 23	2·3	13 52	5000	...	98	2·17	42·6	17·66
632	17	7·42	0 24	2·3	14 20	5100	...	98	2·29	43·8	18·18
624	17	7·56	0 25	2·2	14 48	5200	...	99	2·41	45·0	18·70

Mekometer.

Every battery will be supplied with a mekometer complete.
The equipment consists of—

2 mekometers (right and left instruments), in 2 leather cases, 2 reels, each with one 50-yard cord with S hooks, 4 telescopes, 5 yards of cord (spare),	To be strictly maintained for service.

In time of peace a battery ordered abroad will return its mekometer to store, and will demand a new equipment, except its destination be India, in which case it will receive its new equipment on arrival. The exchange of equipment will be optional in time of war, at the discretion of the officer commanding the battery.

Mekometers belonging to batteries at home wil be inspected annually by the Chief Inspector, Position Finding. He will communicate on this subject with the officers commanding batteries, who will send the instruments when required for inspection direct to him at the Royal Arsenal, Woolwich, except from Ireland, whence the instruments will be sent through the chief ordnance officer in that country. The instruments will be returned in a similar manner to the battery if considered fit for service purposes.

An instrument when condemned, or sentenced to be repaired, by the Chief Inspector, Position Finding, will be returned to store at Woolwich, and the officer commanding the battery to which it belonged will be informed, and directed to put forward an immediate demand for another instrument in its place, of the same nature and class, also to furnish vouchers to cover return to store of the defective instruments.

When an instrument is returned to store or sent to the Chief Inspector, Position Finding, for inspection, a report on its condition at the time will be made on a half sheet of foolscap paper, signed by the officer commanding the battery, and pinned to the history sheet.

Batteries serving abroad will put forward demands, as a rule, every two years for the exchange of their mekometer equipment, for the purpose of being inspected by the Chief Inspector, Position Finding. The old equipment will be sent home by the local ordnance officer to the Principal Ordnance Officer, Royal Arsenal, Woolwich, on receipt of the new one.

A history sheet, in duplicate (one of which will be retained by the Chief Inspector, Position Finding, at Woolwich) will be supplied by the Army Ordnance Department with each instrument, and will be filled in as far as possible, before issue. The history sheets will subsequently be carried on to completion, as shown in the specimen form of history sheet given at page 32. They will accompany the instruments to which they relate on all occasions of inspection or return to store.

Forms G. 849—2. SPECIMEN FORM OF HISTORY SHEET. Army Form G. 920.

Description	Mark.	Number.	Manufacturer.
Depression Range-finder			
Field ,,	,,	,,	,,
,, Mekometer.	,,	,,	,,
,, Telemeter.	,,	,,	,,

Inspection before acceptance. Date Signature of Inspecting Officer.

Issues and Exchanges.				Date.	Inspections.			Repairs.		Signature of Officer who makes the entry.
Date.	From.	To	For.		Occasion.	Remarks of Inspecting Officer.	Recommendation.	Date.	By.	
5.1.87	P.O.O.	C.R.A., Western District	Service... ...	...	...	...	...	...	...	
20.11.87	C.R.A., Western District ...	P.O.O.	Inspection ...	4.12.87	Annual ...	Good order	Service ...	...	...	H.W.
10.12.87	P.O.O.	C.R.A., Western District	Service... ...	...	...	...	...	...	...	
8.6.88	C.R.A., Western District	P.O.O.	Repair of cross wires	20.6.88	After repairs	Good order	Service ...	12.6	Smith	
&c.	&c.	&c.	&c.	&c.	&c.	&c.	&c.	...	...	
10.1.90	C.R.A., Western District	P.O.O.	Repair, blown down, placed too near gun	30.1.92	Inspection ...	Damaged beyond repair ...	Struck off charge	Authority	84 W	

* First line of heading will be filled in by P.O.O.
Second line by Inspecting Officer.

Remaining entries will be made as follows:—
Issue to batteries, or to C.O.O. abroad by P.O.O., also name of instrument-maker who executes repairs.
Returns to store, by Officer returning the instrument.
Inspections, by Inspecting Officer.

SECTION GUN DRILL.

12 pr., 6 cwt.

Battery gun drill, which does not vary with the equipment, is given in "Field Artillery Drill."

The following paragraphs give the duties of the detachments at the section commander's orders.

Single detachments should be accustomed to drill as if forming part of a section, and the instructor should therefore always use the orders given for the section commander.

On dismounted parades the detachment will form "Detachment Rear" where it is laid down for them to mount, and Nos. 6, 7, 8 and 9 will attend to the limber, Nos. 6 and 7 pushing in rear, 8 and 9 at the pole.

ARRANGEMENT.

THE DETACHMENT—
- To tell off.
- Detachment rear.
- To form detachment rear in action.
- To take post from detachment rear in action.
- To move the gun with drag ropes.
- " " without "

PREPARATION FOR ACTION.

ACTION.

DUTIES—
- Wagon supply.
- Casualties.
- Signals.

TO FIRE—
- Miss-fire.

TO LOAD.

MAGAZINE FIRE.

CASE.

TO STAND FAST.

TO CEASE FIRING.

TO LIMBER UP.

INDIRECT LAYING—
- One aiming post.
- Two " posts.

MOUNTING AND DISMOUNTING—
- To dismount the gun and carriage.
- To mount " "

Disabled Ordnance.
To replace a damaged wheel.
To remove a gun and carriage by a limber.
" " " " wagon.
Method of Drilling Recruits—
General remarks.
To fire.
To load.

THE DETACHMENT.

The detachment consists of nine numbers, who fall in two deep one pace between ranks, No. 1 on the right of the front rank.

To Tell Off.

Section Commander.	*No. 1.*
.... Section—Tell off.	

At the order from the section commander—No. 1 numbers 1; the right hand man of the rear rank numbers 2; the right hand man of the front rank, 3; the second man from the right of the rear rank, 4; his front rank man, 5; and so on.

Detachment Rear.

Formed as above, 3 yards in rear of the gun wheels, No. 1 covering the off wheel.

To Form Detachment Rear in Action.

Section Commander.	*No. 1.*
.... Section—Detachment Rear.	No. .... Double March.

At the order from the section commander—No. 1 doubles to his place and gives the order, "Double March."

At the order from the No. 1—The numbers double into their places on the left of No. 1, each halting as he reaches his place.

To Take Post from Detachment Rear in Action.

Section Commander.	*No. 1.*
.... Section—Take Post.	No. .... Double March.

At the order from the No. 1—All the numbers double to their places.

To Move the Gun with Drag Ropes.

Section Commander.	*No. 1.*
.... Section—With Drag ropes, Prepare to advance.	

At the order from the section commander—Nos. 2 and 3 hook the drag ropes to the gun wheel washers, the two highest numbers go to the pole and the remainder man the ropes.

To Move the Gun without Drag Ropes.

Section Commander.	*No.* 1.
.... Section—Without Drag ropes, Prepare to advance.	

At the order from the section commander—Nos. 2 and 3 push between the muzzle and wheels; Nos. 4 and 5 man the gun wheels; the two highest numbers go to the pole, and the remainder assist.

PREPARATION FOR ACTION.

Section Commander.	*No.* 1.	
....Section—Prepare for Action.	No.	Percussion Shrapnel Load.

At the order from the section commander—The detachment dismount, and—

No. 1 sees that the bore is clear, gives the order to load, and superintends the other numbers.

No. 2 fills the tube pocket, places a tube in the vent,* and examines the brake and the shell pocket.

No. 3 removes the breech cover† and straps it on the axle, examines the breech fittings, loads (ramming home himself), sees that the fuze key is in its pocket on the tensile stay, and examines the brake and the shell pocket.

No. 4 removes the cover of the telescopic sight bracket and straps it on the tensile stay, and examines the sights and elevating gear.

No. 5 sees that the fuze keys are in their pockets and examines the limber boxes.

The wagon numbers see that the fuze keys are in their pockets, and examine the wagon boxes. No. 6 supplies No. 3 with one round of shrapnel.

On the completion of the above the detachment mount without further order.

The numbers detailed to "examine" the various ammunition boxes see that they are properly filled, and that the fuzes of all shrapnel are set at "$1\frac{3}{4}$," and the beckets of the safety pins looped over the nuts of the fuzes;‡ also that the lids open easily and the locks are in good order. Any deficiencies in the limber boxes are filled up from the wagon body under the direction of No. 1.

When shell are carried fuzed, all covers will be removed from the cartridges at the same time that the shell are fuzed.

The lanyards of all the fuze keys should be attached to the leather loops inside the fuze key pockets.

---

* A tube is not to be inserted in the vent till the breech is properly closed.

† In very sandy soil the battery commander may order the breech covers to be replaced after loading.

‡ Only when shell are carried fuzed. (*See* page 24.)

If the order "*Telescopic Sights*" is given, No. 4 takes the case containing the telescopic sight out of the box on the limber, and slings it over his shoulder. He puts it back at "Cease Firing."

If the section commander orders "*Without Loading — Prepare for Action*," or "*With Case—Prepare for Action*," the duties are carried out with the necessary alterations.

At drill, rounds will not be loaded; but service shell, fuzed with drill fuzes, will be placed in succession as they are used on the ground on the left of the gun. The end of the handspike will be placed against the base of the hood in the action of "ramming home." Rounds will be returned to their proper place at the conclusion of the series on the order "Replace ammunition."

ACTION.

Section Commander.	*No. 1.*
....Section—Action Front.	No. .... Action Front.

At the order from the No. 1—

The detachment dismount, and No. 3 unkeys, and with No. 2 lifts the trail; when the trail is clear of the hook, No. 3 gives "Limber drive on."

Nos. 2 and 3 carry the trail round half a circle to the left, No. 2 shifting round the trail eye to avoid walking backwards, and lower it to the ground.

Nos. 4 and 5 man the wheels.

The limber moves as detailed in Field Artillery Drill.

As soon as the trail has been lowered to the ground—

No. 1 ships the handspike, lays for direction, and points out the target to No. 4.

No. 2 puts on the brake, takes the lanyard out of the tube pocket and holds it with the hook in his left hand, the extractor in his right.

No. 3 puts on the brake.

No. 4 sets his sight as ordered, and lays for elevation. As soon as the gun is laid he holds up his hand. He should remain in position until the signal "Make ready" is given, but should not weary his eye by looking over the sights.

No. 5 fills the portable magazines with shrapnel, loosening the nuts of the fuzes; if wagon supply is ordered, he takes post 10 yards in rear of the gun until the arrival of the wagon.

No. 6 assists No. 5, and takes a portable magazine up to the gun as soon as one is ready, placing it near No. 3, but clear of the recoil.

The positions of the numbers are as follows:—

No. 1 one yard in rear of the trail eye.

Nos. 2 and 3 close to and facing the breech.

No. 4 on the right of the trail eye.

No. 5 in rear of the limber on the off side.

No. 6 in rear of the limber on the near side.

Action right, left, or rear is the same except that at—

Action Right.—The trail is carried round a quarter of a circle only.

Action Left.—The trail is carried round a quarter of a circle to the right, No. 3, in this case, shifting round the trail eye.

Action Rear.—The trail is not carried round.

The limbers in all cases move as detailed in Field Artillery Drill.

DUTIES.

No. 1

Commands, attends to the handspike, sees that the time fuzes have been set correctly, rams home, and lays for direction.

He is responsible for the entire service of his gun.

While in action he will pay particular attention to the following points:—

That the gun is in the general alignment of the battery.

That the shell pockets are filled up, and that their lids are kept closed and fastened.

Should it be necessary for No. 1 to leave his place, No. 2 will perform his duties at the handspike in addition to his own duties.

Should a case arise in which it is desirable that No. 1 should lay, he will perform the duties of No. 4, with the addition of "commands and sees that the time fuzes have been set correctly," No. 4 performing No. 1's duties with the above exceptions.

He lays for direction by looking along the line given by the elevating screw, cam lever, and muzzle, while standing at the end of the handspike, not by looking over the sights. When, however, great accuracy of line is of importance, the laying for direction will be done by No. 4, in which case No. 1 will traverse according to No. 4's signals.

He only gives the words of command shown for him; he does not repeat the section commander's orders. His executive orders should be no louder than is necessary for his subdivision to hear.

No. 2

Attends to the brake, shell pocket and vent, fires, and mans the wheel.

He must take every opportunity, after coming into action, of filling up the shell pocket, if any rounds have been taken from it; this must be done without interrupting the service of the gun.

He must stand clear of the layer when telescopic sights are used.

No. 3

Attends to the brake, shell pocket, and breech, supplies himself with ammunition from the portable magazine, or, if one has not been brought up, from the shell pocket, placing the cartridge under his left arm until he has loaded the shell; sets time fuzes during ranging, shows them to No. 1, takes out safety pin or pins, loads, and mans the wheel.

He opens and closes the breech as follows:—

To Open the Breech.—He takes hold of the cam lever with his right hand, raises it to its full extent, draws it towards him as far as it will go, and folds it down and then throws the breech open.

To Close the Breech.—He takes hold of the cam lever with his right hand, raises it to its full extent, and swings the breech screw round until the carrier ring is flush against the breech of the gun. Still keeping the lever raised, he then pushes the screw home, and then forces the lever from him as far as it will go and folds it down. If the breech screw will not turn, he starts it back by lowering the cam lever slightly, then forces the lever from him as far as it will go, and folds it down.

He must take every opportunity, after coming into action, of filling up the shell pocket, if any rounds have been taken from it; this must be done without interrupting the service of the gun.*

---

* Although Nos. 2 and 3 are thus responsible that the shell pockets are kept filled, No. 1 should order No. 6 to bring up single rounds fuzed at 1¾, as opportunity offers, without interfering with the service of the gun in action.

No. 4

Lays for elevation and lifts at the handspike in running up or back.

The position for the layer is detailed in Field Artillery Drill. Straddling the trail interferes with the laying of the handspike number, and is an incorrect position.

No. 4 must keep the gun laid for elevation whether loaded or not; he must remember to look over the sights after the loading is completed, to see that the gun has not been shifted. He must always *depress* last.

As a general rule the whole of the laying for direction will be done by No. 1, but when great accuracy of line is of importance No. 4 will lay for direction also, using the signals given in the Handbook.

If through casualties there are no N.C.O.'s left in the detachment, No. 4 will command, and see that the time fuzes have been set correctly, in addition to his other duties.

No. 5

Fills the portable magazines, loosening the nuts of time fuzes during ranging, and setting them after that is completed.

At "Magazine Fire," he will, alternately with No. 6, supply single rounds of ammunition.

No. 6

Supplies No. 3 with ammunition in the portable magazines, and assists No. 5.

As a general rule only one portable magazine should be at the gun at a time, so that if change of fuze, &c., is ordered it may be immediately carried out by Nos. 5 and 6.

When firing at a moving target, the second round of time shrapnel having been prepared at the limber or wagon, is at once taken up by No. 6, and shown by him to No. 1. No. 6 then stands ready to hand it to No. 3 when required.

At "Magazine Fire," he will, alternately with No. 5, supply single rounds of ammunition.

Except when it is otherwise ordered, the numbers work on their own sides of the gun, even numbers on the right side, odd numbers on the left.

Note.—On no account should a fuze without a safety pin be placed in any ammunition box.

Wagon Supply.

One wagon for each section is brought up as detailed in Field Artillery Drill.

As soon as the wagon halts the Nos. 5 of the two guns of the section go to the wagon body and issue ammunition to their respective guns as above detailed.

The numbers brought up on the wagon, first unhook the wheel horses, and then perform the duties detailed for No. 6 to the two guns of the section—the numbers on the off side of the wagon to the right gun, those on the near side to the left gun. If there are six numbers with the gun, no men should be sent up on the wagon.

At standing gun drill without wagons Nos. 7, 8 and 9 stand 5 yards in rear of the limber.

Casualties.

The captain is responsible for the replacement of casualties as directed in Field Artillery Drill. Section commanders order such changes of duties in their sections and detachments as they consider

necessary. If the full detachments cannot be maintained the duties are divided as follows:—

With five numbers.—No. 5 performs the duties of Nos. 5 and 6.

With four numbers.—No. 2 performs the duties of Nos. 5 and 6; No. 4 performs the duties of Nos. 2 and 4.

SIGNALS.

Nature.	By whom given.	Meaning.
Either hand raised above head ..	No. 4	My gun is laid.
Motions with either hand in the required direction, arm well back ..	No. 4*	Trail right or left.
Drops his hand	No. 4*	Halt (traversing).
Points to the vent with his right hand	No. 1	Make ready.

TO FIRE.

No gun is ever to be fired without an *order* from the No. 1; and the No. 1 must never give this order until he has received the order from the section commander and seen that the gun is in proper condition.

Section Commander.	*No.* 1.
Fire No. ....Gun.	Points to the vent. No. ....Fire.

At the order from the section commander—No. 1 steps clear of the recoil to the left and points to the vent with his right hand.

At this signal from the No. 1—

No. 2 hooks the lanyard to the tube, steps outside the wheel, and stands facing to the front, holding the lanyard tight with his right hand, the forearm across the body, and the elbow so bent that the hand is level with the vent.

Nos. 3 and 4† step clear of the recoil.

As soon as he sees No. 2 ready and the other numbers clear, No. 1 gives the order, "No. .... Fire."

At this order from the No. 1—No. 2 slews his body to the right, and thus fires the gun; he then places the lanyard round his neck, the hook end hanging down on his left side, the extractor on his right.

Directly the gun stops in its recoil it is run up to its previous position without any order.

No. 1 assists if he considers it necessary.

Nos. 2 and 3 man the wheels.

No. 4 lifts at the handspike.

As soon as the gun is run up—

No. 1 lays for direction.

No. 2 takes out the tube.

No. 3 opens the breech and supplies himself with a fresh round of ammunition.

No. 4 lays for elevation.

* Only when, great accuracy for line being required, the laying for direction is done by No. 4.

† When using telescopic sights, No. 4 must remove the sight before stepping clear. Until new pattern sights are issued he must also do this with the tangent sight.

MISS-FIRE.

If there is a miss-fire* Nos. 2 and 3 go round to the front of the axletree; No. 3 holds up the cam lever while No. 2 takes out the old tube and puts in a fresh one, both taking care not to disturb the gun. They return to their places. No. 2 hooks the lanyard to the tube when the signal "ready" is given.

TO LOAD.

Section Commander.	*No.* 1.
.... Section—Shrapnel Fuze .... Load.†	No. .... Shrapnel Fuze .... Load.†

At the order from the No. 1—

No. 2 takes the lanyard from round his neck and holds it ready, the hook in his left hand, the extractor in his right.

No. 3 sets the time fuze (when ranging), shows it to No. 1, takes out the safety pin or pins and places the shell in the bore.

As soon as he sees that No. 3 is ready to load—

No. 1 takes the handspike in the centre with his left hand back up, withdraws it from the socket, cants it over unshod end next the gun, meeting it with his right hand back up, takes a pace to the front with his left foot, and placing the unshod end against the shell, rams it gently home; then *keeping the handspike against the shell*, he applies his whole force to ensure its being true home.‡ He then steps back and replaces the handspike in the socket.

As soon as the shell has been rammed home—

No. 3 places the cartridge in the chamber, closes the breech, and holds up the cam lever, whilst No. 2 inserts a tube.

MAGAZINE FIRE.

Section Commander.	*No.* 1.
... Section—Magazine Fire.	

At the order from the section commander—

No. 4 lays for elevation by placing two fingers over the tangent sight§ which is run down in the socket.

The guns are reloaded with shrapnel, fuze $1\frac{3}{4}$, as soon as fired without any further order.

Nos. 5 and 6 alternately supply No. 3 with single rounds of shrapnel fuze $1\frac{3}{4}$ from the limber or wagon.

The gun is not run up between rounds unless necessary.

No. 3 should not show the time fuzes to No. 1.

CASE.

Section Commander.	*No.* 1.
.... Section—Case.	

This is exactly the same as above, substituting case for shrapnel, fuze $1\frac{3}{4}$; as soon as the last case in the limber or wagon has been supplied to No. 3, the numbers at the limber or wagon set shrapnel fuzed at 0, and supply them in the same way as case.

---

* It is not a missfire if the wire breaks and the friction bar is *not* withdrawn.

† Or "Percussion Shrapnel Load."

‡ In the event of a shell jamming in the bore during loading, a cartridge will be cut shorter (by order of the section commander), and the shell blown out.

§ As in most cases the left tangent sight will be already run down in the socket, time will be saved by using it.

TO STAND FAST.

Section Commander.	*No.* 1.
.... Section—Stand Fast.	

At the order from the section commander—

All stand fast whatever they are doing, except that No. 2 unhooks the lanyard if it is hooked to the tube, and that if a safety pin has been taken out, No. 3 places the shell in the bore.

At the order "*Go on*" the work is continued.

TO CEASE FIRING.

Section Commander.	*No.* 1.
.... Section—Cease Firing.	No..... Percussion Shrapnel Load.

At the order from the No. 1—

The guns are loaded, and each number, *as soon as he has performed his share of the loading*, proceeds as follows:—

No. 1 straps the handspike on the trail.

No. 2 takes off the brake, puts the lanyard into the tube pocket, and sees that the shell pocket is properly shut.

No. 3 takes off the brake, and sees that the shell pocket is properly shut.

No. 4 places the telescopic sight (if it is in use) in it's case, and returns the case to the box on the limber.

Nos. 5 and 6 strap the portable magazines in their places without removing any ammunition that may be in them.

If the section commander orders "*Without Loading—Cease Firing*," or "*With Case—Cease Firing*," the duties are carried out with the necessary alterations.

Note.—If for any reason it is impossible to fire the guns at "Cease Firing," the battery commander may order the cartridges to be withdrawn, and the shell left in the bore.

In cases where the time pin has been taken out before the order "Cease Firing" is given, the loading will be completed and the gun fired as if it had been loaded when the order was given.

TO LIMBER UP.

Section Commander.	*No.* 1.
.... Section—Front, Limber Up.	

At the order from the section commander—

Nos. 2 and 3 carry the trail round half a circle to the right, No. 2 shifting round the trail eye to avoid walking backwards, and lower it to the ground.

Nos. 4 and 5 man the wheels.

As soon as the trail is lowered the numbers get under cover—

No. 1 in front of No. 2.

Nos. 2 and 3 between breech and wheels.

Nos. 4 and 5 between muzzle and wheels.

Nos. 6 and 7 in front of Nos. 4 and 5.

The whole with their backs to the axletree.

The *limber* comes up as detailed in Field Artillery Drill, and No. 1 gives "Halt, limber up."

At the order from the No. 1—

Nos. 2 and 3 lift the trail and place it on the hook.

No. 3 keys up.

Nos. 4 and 5 man the wheels.

On the completion of the above the detachment mount without further order.

Right, left, or rear limber up is the same except that at—

Right Limber Up.—The trail is carried round a quarter of a circle only.

Left Limber Up.—The trail is carried round a quarter of a circle to the left, No. 3 in this case shifting round the trail eye.

Rear Limber Up.—The trail is not carried round.

The limber, in all cases, moves as detailed in Field Artillery Drill.

INDIRECT LAYING.

Aiming posts should be issued in pairs of the same colour, the right guns of sections having red, the left blue. They should be planted with their coloured sides towards the guns, except when, owing to light, &c., the section commander orders the white side.

One Aiming Post.

Section Commander.	*No.* 1.
....Section—One Aiming Post.	

At the order from the section commander—

No. 1, standing at the end of the handspike, directs No. 4 by signal to plant his aiming post in line with the target.

Nos. 2 and 3 mark on the ground the position of the wheels.

No. 4 doubles out about 50 yards to the front with one aiming post, which he plants as directed by No. 1; he then doubles back and gets out his clinometer.

At "Go on" the firing is continued, the gun being laid for direction on the aiming post, and for elevation by the clinometer on the telescopic sight.

When the target cannot be seen by the No. 1 dismounted, the section commander will direct whether he should mount or stand up on the limber.

Two Aiming Posts

Section Commander.	*No.* 1.
....Section—Two Aiming Posts.	

At this order from the section commander, which is given when the battery is halted under cover, previous to occupying a position by the deliberate method—

No. 4 gets out his clinometer and aiming posts.

As soon, then, as the battery commander gives the signal (*see*

Field Artillery Drill), the section commanders and layers fall out in the usual way, but each layer carries his two aiming posts and telescopic sight instead of tangent sights.

The battery commander, after pointing out the target, shows the position of the front post of the directing gun; the layers of the remaining guns extend along the alignment and plant their front posts at the interval ordered.

Each layer, as soon as he has planted his front post, doubles a short distance to the rear, and plants his second post in line with the target and the front one. He then takes up a position for his gun out of sight of the target and in line with his two posts, looking to the directing gun for his dressing.

The section commanders see that the layers are properly placed before they double back to the battery.

Then, when the battery commander gives the signal to advance, the battery is brought into action as detailed in Field Artillery Drill, Chapter III, Section 8 (ii). As however it is very important that the guns should be brought exactly into line with the two posts, it will usually save time if the battery is advanced at a walk and in such a manner that the guns may be brought into action "right" or "left."

Nos. 2 and 3 mark on the ground the position of the wheels.

After the first round the gun is laid for direction on the near aiming post only.

MOUNTING AND DISMOUNTING.

This should only be practised at the annual course of military training, and then only sufficiently for instruction; every care must be taken that the equipment is not injured.

To Dismount the Gun and Carriage.

Section Commander.	*No. 1.*
Dismount No. .... Gun and Carriage.	No. .... Prepare to Dismount the Gun. Dismount the Gun. Dismount the Carriage. Lift—Lower.

At the order "Prepare to Dismount the Gun"—

No. 1 removes the sights, disconnects the elevating gear, runs it up and throws it back, and mans his handspike.

Nos. 2 and 3 unkey the capsquares, remove the drag shoe, &c., and man the wheels.

Nos. 4 and 5 double two drag ropes and make fast the bights with a reef knot, half under and half over the breech, just in rear of the sight sockets; the running ends are then passed outside the tire of the wheels on the same level as the breech, two turns taken round the felloe, one on each side of a spoke to prevent slipping, and made fast with a half-hitch, blackwalling against the tire. Nos. 4 and 5 then man the wheels.

Nos. 6 and 7 bring up the drag ropes to Nos. 4 and 5, and man the wheels.

Nos. 8 and 9 bring up the spare handspike, place it in the bore and man it.

At the order "Dismount the Gun"—

Nos. 8 and 9 lift the gun clear of the trunnion holes and keep it horizontal.

Nos. 2 and 3 raise the capsquares; Nos. 2, 4, and 6, 3, 5, and 7, man the wheels forward until the gun is lowered to the ground. No. 1 raises the trail off the ground until the trunnions are clear; as soon as the gun is clear of the trunnion holes Nos. 2 and 3 should lower the capsquares to prevent jamming.

At the order "Dismount the Carriage"—

Nos. 2, 3, 4, and 5 go to the carriage, Nos. 2 and 3 in rear, 4 and 5 in front.

Nos. 6, 7, 8, and 9 go to the wheels, Nos. 6 and 7 in front, 8 and 9 in rear.

Nos. 8 and 9 take off the linch pins and washers.

At the order "Lift"—The carriage is lifted, and the wheels taken off.

At the order "Lower"—The wheels are placed on the ground dish down, and the carriage is lowered to the ground.

To Mount the Gun and Carriage.

Section Commander.	*No. 1.*
Mount No. .... Gun and Carriage.	No. .... Mount the Carriage. Lift. Prepare to Mount the Gun. Mount the Gun.

This is exactly the opposite to the dismounting just described.

Nos. 2 and 3 do not raise the capsquares until the trunnions are about 6 in. from them. This is to allow the jacket to drop in rear without jamming.

Note.—Limbers and wagons are mounted and dismounted in a similar way, the poles having been previously removed.

DISABLED ORDNANCE.

Whenever operations are not described in detail or numbers are not told off to particular duties, the No. 1 will order such duties to the several numbers as may be required.

To Replace a Damaged Wheel.

Should a gun wheel be disabled in action, it should be immediately turned so as to bring the sound part on to the shoe, and, if necessary, lashed, and notice should be sent to the captain.

The latter will immediately send up another wheel, which will be brought alongside the damaged one, and the wheels changed as follows:—

Section Commander.	*No.* 1.
No..... Change Wheels.	No..... Change Wheels. Lift. Lower

At the order "No. .... Change Wheels" from the No. 1—

Nos. 1 and 6 go to the damaged wheel, No. 1 in rear. No. 6 removes the linch pin and washer.

Nos. 2, 3, 4, and 5 man the traversing handspike, which is placed under the axletree by No. 2 or 3 (according to side).

At the order "Lift"—

The axletree is lifted, and the damaged wheel is taken off. No. 6 rolls it out of the way, and the new wheel is put on by the numbers who have brought it up.

At the order "Lower"—

The carriage is lowered, the linch pin and washer put on by No. 6, the handspike replaced by No. 2 or 3, and all resume their duties in action.

The damaged wheel is either left on the ground or removed by the numbers who brought up the new one, as the captain may have directed.

In removing wagon wheels the lifting jack should be used.

To Remove a Gun and Carriage by a Limber.

The gun is dismounted, the horses taken out; the limber is run over the gun so that the breech is towards the pole, and the trunnions under the limber hook; the muzzle and the pole are raised, and the gun slung with a drag rope round the trunnions to the limber hook; the end is passed to the front, and the muzzle borne down, a half-hitch taken round the breech, and made fast to the futchels.

The carriage is dismounted, the elevating gear run up, and thrown back. It is then lifted, trail first, up the front of the limber on to the top front of the box, until the weight is balanced for draught.

The trail is secured by the drag chain to a handspike in the bore; the wheels are placed, dish down, on the top of the carriage, securely lashed with drag ropes to the futchels and limber hook in rear and to the footboard in front.

To Remove a Gun and Carriage by a Wagon.

The gun is slung to a limber as before. The carriage is lifted by all the numbers on to the wagon body until the trail eye nearly touches the limber box; it is secured to the perch by the drag chain. The wheels are placed, dish down, on the top of the carriage, and lashed.

METHOD OF DRILLING RECRUITS.

General Remarks.

Many good recruits are acquainted only with the commonest English words, and as their duties and the material they have to use are altogether new and strange, instructors should be careful—

To use the simplest language possible.

To explain, as they occur, all technical terms.

To illustrate descriptions by means of a piece of chalk or otherwise, and in all cases to render clear the object of the various duties.

Not to attempt to teach recruits elaborate descriptions, exact measurements, &c., which they do not understand.

To avoid needless repetitions, or wearying the men by keeping them for a long time at one thing; the drill should be varied by short descriptions (avoiding manufacturing details), setting fuzes, &c.

To bring men forward by successive steps, by explaining a position and then doing it; for instance, when commencing recruits' gun drill, the instructor should himself show how a duty should be performed and then cause every man in turn to do that duty (make every man do No. 1's duty, then every man No. 2's, then No. 4's, and so on). When each man knows the duties of each post separately, the numbers who work and move together should be instructed after the manner described below before commencing gun drill in quick time.

Great patience is necessary on the part of the instructor. He must make allowance for the different capacities of the recruits, and squads should periodically be arranged, so that the intelligent soldier may reap the advantage of his work, and not be kept back by those of inferior ability. Recruits, as they progress, should be called out in turn to drill, for this gives a man confidence, helps him to learn, and causes him to take an additional interest in his work.

The instructor should place himself where he can be seen and heard by all in the squad, should stand in a smart, soldierlike attitude, and should avoid pacing up and down, looking down on the ground, turning his back on the squad, and similar habits, which have the effect of fidgeting the men and distracting their attention.

His explanation should be given in a distinct voice; his word of command should be sharp and decisive.

Stress is laid on the above points because men unconsciously imitate their instructor. A first-rate instructor will make a good detachment; his manner and style are therefore of the first importance.

The utmost alertness of attitude and smartness of movement should be enforced throughout gun drill.

The instructor can at any time ascertain that each number is at his post by proving. This he does by calling out, "*Prove your numbers —No. 1, No. 2, &c.*" The man called upon raises his right hand and extends it smartly to the front, hand open, thumb uppermost, hand as high as the shoulder. When the next number is called he drops his hand. The last number lowers his hand at the word "*Down.*"

If at any time the instructor wishes to change the numbers, he gives the order "*Change Rounds.*" On this, No. 1 becomes 9; 9, 8; 8, 7; 7, 6; 6, 5; 5, 4; 4, 3; 3, 2; 2, 1.

The following is only an example of how the drill should be taught; the details of the other operations should be divided up in a similar manner.

To Fire.

At the order "*Fire No..... Gun*" from the section commander—

No. 1 steps clear of the recoil to the left, and points to the vent with his right hand.

At that signal—

No. 2 hooks the lanyard to the tube, steps outside the wheels, &c.

Nos. 3 and 4 step clear of the recoil.

No. 1—"Fire No..... Gun."

As soon as No. 1 sees No. 2 ready, and the other numbers clear, he gives "No..... Fire."

At that order—

No. 2 slews his body to the right, and thus fires the gun; he then places the lanyard round his neck.

"*Go on.*"

Next explain that directly the gun has ceased recoiling it is run up to its previous position without any further order.

No. 1 assists if he considers it necessary.

Nos. 2 and 3 man the wheels.

No. 4 lifts at the handspike.

Nos. 1, 2, 3 and 4—"Go on."

Next explain—

As soon as the gun is run up—

No. 1 lays for direction.

No. 2 takes out the tube.

No. 3 opens the breech, and supplies himself with a fresh round of ammunition.

No. 4 lays for elevation.

Nos. 1, 2, 3 and 4—"Go on,"

To Load.

At the order "*Shrapnel Fuze — Load,*" from the section commander--

No. 1 gives the order to his detachment—

No. .... "*Shrapnel Fuze—Load.*"

No. 2 takes the lanyard from round his neck and holds it with the hook in his left hand, the extractor in his right.

No. 2—"*Load.*"

No. 3 sets time fuzes during ranging only (after ranging is completed they are set by No. 5), shows them to No. 1, takes out, &c., &c.

No. 3—"*Load.*"

Next give—

As soon as No. 1 sees that No. 3 is ready to load, he takes the handspike, &c.

No. 1—"*Go on.*"

Next give—

No. 3 as soon as the shell has been, &c., &c.

No. 3—"*Go on.*"

List of Stores.

Carriage.

Description.	No.	Where carried.
Bits, vent, 14-in.	1	Right ammunition pocket.
Brushes, breech..	1	In upper trail box.
Buckets, water, G.S., leather	2	On breast chain rings.
Cans, lubricating, No. 9	1	In lower trail box.
Caps, sponge, No. 6	2	On cleaners.
Cartridges, 12 $\frac{7}{10}$ oz. cordite, size 5 ..	6	In shell pockets.
Cleaners { piassaba	1	On left tensile stay.
Cleaners { wool	1	On right tensile stay.
Covers { breech	1	On breech of gun.
Covers { cartridge	6	On cartridges.
Covers { telescopic sight bracket ..	1	On sight bracket.
Hammers, claw, 20-oz...	1	In upper trail box.
Handspikes, traversing, No. 2.. ..	1	On top of trail.
Keys, fuze, universal	1	In pocket on left tensile stay.
Oil, Rangoon .. .. .. pint	½	In oil can.
Pincers, carpenters' .. .. pairs	1	In upper trail box.
Posts, aiming	2	On left bracket.
Pockets { key, fuze, universal ..	1	On left tensile stay.
Pockets { tube, T	1	On right tensile stay.
Rimers, vent, T	1	In right ammunition pocket.
Rods, vent, 14-in.	1	" " "
Shells, shrapnel..	4	In shell pockets.
Shot, case	2	In shell pockets.
Shoes, drag, No. 7	1	On breast of carriage.
Spanners, McMahon, 15-in.	1	In upper trail box.
Spanners, No. 93	1	On right bracket.
Tampeon..	1	Strapped on right side of axletree, except in the gun park (vide p. 28).

Limber (Carriage and Ammunition Wagon).

Axes { felling	1	Under foot-board.
Axes { pick { heads, 6½-lb. ..	1	" limber.
Axes { pick { helves, 34½-in. ..	1	" "
Bags { kit	2	On top of box.*
Bags { picketing gear	1	On platform board.
Bar, supporting pole	1†	On platform board.
Blankets, G.S.	2	On top of box.
Boxes, fuze { No. 20	2	In compartments of limber box.
Boxes, fuze { " 21	1	In compartments of limber box.
Boxes, fuze { " 28	1	In compartments of limber box.
" grease, 3-lb.	1	Rear of axletree, "off" side.
" obturating pads	1	In compartment of limber box.
" sight, telescopic	1	On platform board, "near" side.
Brushes, water, carriage	1	On limber, "near" side.
Buckets, water, G.S., leather	2	Under limber.
Cans, lubricating, No. 3	1	Rear of axletree, "off" side.
Cases, can, lubricating, No. 3	1	" " " "
Cartouches	2	In limber box.
Cartridges, 12 $\frac{7}{10}$-oz., cordite, size 5 ..	44	" "
Clamps, tangent, sight {	2	1 in "off" and 1 in "near" holdall, gun limber.
Clamps, tangent, sight {	1†	In "near" holdall, wagon limber.
Cloths, sponge	5	In each limber as convenient.
Couples, trace	2	In "off" holdall.
Covers, cartridge	44	On cartridges.
Discs, pad, obturating { adjusting	1	In compartment, limber box.
Discs, pad, obturating { protecting	1	In compartment, limber box.
Drivers, screw, G.S., 4-in.	1	In "off" holdall.
Fuzes, time and percussion, No. 50 ..	46	In fuze boxes.

* Wagon limber only. † 1 per section.

List of Stores—*continued.*

LIMBER—*continued.*

Description.	No.	Where carried.
Grease, Field's .. .. .. lb.	3	In grease box.
Hooks, bill	1	Under limber, "off" side.
Keys, fuze, universal*	2	In pockets in rear of box.
,, spring lock	2	In pocket rear of limber box.
Kettles, camp, oval, 12 quarts ¶ ..	1	Under limber, "near" side.
Lanyards, friction tube, T	2	In "near" holdall.
Levers, cam	1†	In compartment, limber box (wagon).
Magazines, portable	2	In rear of limber box.
Mallets	2	On platform board.
Oil, Rangoon .. .. .. pint	1	In oil can.
Pads, obturating	1	In compartment, limber box.
Pegs, picketing‖	10	On platform board.
Pins, linch, 2nd class, split	1	In "off" holdall.
Pin, pole, No. 17 pole	1†	In compartment "near" box, gun limber.
Rimers, vent, T	1	In "near" holdall.
Ropes { drag, light .. .. pairs	1	On platform board.
Ropes { heel	1	On platform board.
Ropes { picketing, 4 ft. 9 in.	6	On platform board.
Shells, Shrapnel	42	In limber box.
Shot, case	2	In limber box.
Sights, fore {	2	In "off" holdall, gun limber.
Sights, fore {	1†	In "off" holdall, wagon limber.
,, tangent {	2	1 in "off" and 1 in "near" holdalls, gun limber.
,, tangent {	1†	In "near" holdall, wagon limber.
,, telescopic	1‡	In telescopic sight box.
Spades, N.P.	2	One on each side of limber box.
Straps, securing, 44" × 1" (camp kettle lids)¶	1	On lid of kettle.
Swingletrees, No. 10	1	On platform boards.
Tubes, T, friction .. .. {	50	In limber box { wagon limber.
Tubes, T, friction .. .. {	60	In limber box { gun ,,
Vents, T, axial	1	,, ,,
Washers, drag, 2nd class, C	1	Under platform board, "near" side,
,, ,, ,, ,, with Q ..	1	,, ,, ,, "off" ,,
Wrench, breech mechanism A ..	1	In "near" holdall.

AMMUNITION WAGON.

Bags, kit..	2	On top of ammunition box.
Blankets, G.S.	2	On top of ammunition box.
Bolts, stop	1§	In holdall, spare parts of gun.
Boxes, fuze, No. 20	3	In ammunition box.
,, grease, magazine, 14-lb. ..	2	Rear of axletree.
Cap, sponge, No. 4	1§	On sponge.
Cartouches	2	In ammunition box.
Cartridges, 12-$\frac{7}{16}$-oz. cordite size 5 ..	48	,, ,,
Cases, saw, hand	1	In front of ammunition box.
Collars, actuating	3	In holdall, spare parts of gun.
Covers, cartridge	48	On cartridges.
Cutters, wire	1	Front of ammunition box, "off" side.
Fuzes, time and percussion, No. 56 ..	48	In fuze boxes.
Grease, Field's .. .. .. lb.	28	In grease boxes.
Handspikes, common, 6-ft.	1	Under perch.
,, traversing, No. 2.. ..	1	,, ,,
Holdalls, needles, and silk twist .	1	In "off" holdall.
,, spare parts of gun	1	In compartment, ammunition box.

* When guns are parked, the fuze keys will be placed in holdalls in limbers.
† 1 per section.
‡ 1 on each carriage limber and 1 spare with "A" sub-division wagon limber.
§ 1 per battery.
‖ 4 only on wagon limber.
¶ As required.

List of Stores—*continued.*

Ammunition Wagon—*continued.*

Description.	No.	Where carried.
Jacks, lifting, G.S.	1	On platform board.
Kettles, camp, oval, 12-qts.§	2	Under wagon.
Keys, fuze, universal*	2	In pockets in rear of box.
„ powder case	1	In "off" holdall.
„ spring lock	2	In pocket, rear of ammunition box.
Knives, clasp	1	In "near" holdall.
Lashings, tarred, 1-in., 10-ft. ..	2	On axletree.
	2†	Securing spare pole.
Magazines, portable	2	In rear of wagon.
Needles, magazine, phosphor bronze, 4-in.	2.	In holdall, needles and silk twist.
Pins, keep, bolt elevating	2	In holdall, spare parts of gun.
„ „ hinge, bolt, carrier ring ..	2	
Pole, No. 18, jointed, spare†	1	
Saws, hand, 26-in.	1	In front of ammunition box.
Scissors, magazine .. .. pairs	1	In "near" holdall.
Shell, shrapnel	46	In ammunition box.
Shot, case	2	„ „
Shoes, drag, No. 7	1	On perch.
Silk twist .. .. .. oz.	2	In holdall, needles and silk twist.
Sponges, R.M.L., 13-pr., jointed ..	1‡	Under perch.
Springs, catch, vent, axial	2	In holdall, spare parts of gun.
„ clip, carrier ring	2	
„ stud, catch	4	
„ retaining, fore sight	4	
Straps, securing, 44-in. × 1-in.§ ..	2	Camp kettle lids.
Tubes, friction, T	50	In compartment of ammunition box.
„ „ T, drill..	1	In "near" holdall.
Washers, arm, axletree, 2nd class, C $\frac{1}{16}$-in. thick ..	1	Under holdall in "off" box.
$\frac{3}{32}$-in. „ ..	1	

* When guns are parked, the fuze keys will be placed in holdalls in limbers.
† Per section. ‡ 1 per battery. § As required.

Description.	War. — Three Months' Supply.	For use in Peace. — Twelve Months' Supply. *	For what Purpose.	Where carried.
Woolwich Store Charge No. 4.				
Staples, round, crowned, small	6	2	Wagons, Ammunition, and Store and Artillery	Forge limber.
Woolwich Store Charge No. 9.				
Solder, tinman's .. .. bars	6	..	Tinwork	No. 2 drawer, smiths' tool chest.
Spelter, brass .. .. lbs.	¼	..	Brazing	
Steel, mild, hoop { 3¾-in. wide, No. 13 W.G. .. .. feet	..	1	Per ammunition box, for fitting new sides or ends.	Store wagon.
Steel, mild, hoop { 2 „ „ 14 „ .. .. „	..	2		
Steel, mild, hoop { 1½ „ „ 14 „ .. .. „	..	2		
Woolwich Store Charge No. 10.				
Chain, steel, weldless, No. 8 .. .. yds.	1	2	Repair to suspending chains ..	Forge wagon limber.
Nails { copper, rose head, strong, No. 451 .. .. lbs.	1	1½	General repairs	No. 3 drawer, wheelers' tool chest.
Nails { iron, clout, wrought, countersunk head, No. 104 „	1½	½		
Nails { steel, brad, fine pointed, No. 26 .. .. „	1	⅛		
Nails { steel, clasp { fine, No. 72 .. .. .. „	2	½		
Nails { steel, clasp { strong, No. 80 .. .. .. „	2	½		
Screws, iron, flat head { 3-in., gauge No. 16..	48	..		
Screws, iron, flat head { 2½ „ „ 16..	24	..		
Screws, iron, flat head { 2 „ „ 14..	24	6		

Screws, iron	flat head	1½	"	"	13..	..	..	36	..	General repairs	No. 3 drawer, wheelers' tool chest.
		1	"	"	12..	..	..	36	..		
		¾	"	"	10..	..	..	36	8		
		¾	"	"	13..	..	..	36	8		
		¾	"	"	13..	..	..	..	32	Per ammunition box, for fitting new sides or ends	
		⅞	"	"	8..	..	..	36	4		
	round head, 1¼-in., gauge No. 13					..	..	24	..	General repairs	No. 3 drawer, wheelers' tool chest.
Tacks	copper, No. 473..					..	lb.	1	1		
	steel, cut, No. 192					..	"	½	⅛		
	Woolwich Store Charge No. 11.										
Borax, refined						..	lb.	½	..	Brazing	No. 2 drawer, smiths' tool chest. Forge limber.
Glue, best town made						..	"	1	¾	.. ..	
Oil, linseed, boiled†						..	pints	..	4	Elevating gear, and working parts of carriage	
Paint	lead, white					..	ozs.	..	8	Lettering batteries and painting discs of aiming posts	Forge limber.
	blue, ultramarine (dry)					..	"	..	2	Painting discs of aiming posts ..	
	red, Chinese (dry)					..	"	..	2		
Resin, black						..	lb.	½	..	Tinwork	No. 2 drawer, smiths' tool chest.
Salammoniac, in lumps						..	"	½	..		
Turpentine, spirits of						..	pints	..	¼	Lettering batteries	Forge limber.
	Woolwich Store Charge No. 13.										
Bolts	with nuts, hexagon head, ⅜-in. × 1⅛-in.					..	..	6	..	.. ..	No. 3 drawer, wheelers' tool chest.
	with nuts, nave, 2nd Class, "C"	No. 35 wheel	bevel head			..	..	..	1	.. ..	
			plain	"		..	..	..	1	.. ..	
		" 36 "				..	..	..	2	.. ..	

* Carried as convenient.

† 2 pints of this oil allowed for station equipment.

Description.	War. — Three Months' Supply.	For use in Peace. — Twelve Months' Supply. *	For what Purpose.	Where carried.
Woolwich Store Charge No. 13—continued.				
Forges, field, R.A. — handles, lever, Mark IV	1	..	..	Forge wagon (Mark II only).
Forges, field, R.A. — Screws — cheese head, $\frac{3}{16}$-in. × $\frac{7}{16}$-in. (set of 8)†	1	..	..	No. 3 drawer, wheelers' tool chest.
Forges, field, R.A. — Screws — hexagon head, $\frac{1}{4}$-in. × $\frac{5}{8}$-in. (set of 9)†	1	..	..	No. 3 drawer, wheelers' tool chest.
Hooks, draught, B.L., 12-pr., 6 cwt. — near	1	..		
Hooks, draught, B.L., 12-pr., 6 cwt. — off	1	..		
Iron, pieces — angle, 2-ft. 8-in. × 2-in. × $\frac{1}{4}$-in.	..	1		
Iron, pieces — bolt, 2-ft. 8-in. × $\frac{7}{8}$-in.	1	..		
Iron, pieces — bolt, 2-ft. 8-in. × $\frac{3}{8}$-in.	1	..		
Iron, pieces — bolt, 2-ft. 8-in. × $\frac{1}{2}$-in.	1	1		
Iron, pieces — bolt, 2-ft. 8-in. × $\frac{1}{4}$-in.	1	..	General repairs	Store wagon.
Iron, pieces — flat, 2-ft. 8-in. × 3-in. × 1-in.	1	1		
Iron, pieces — flat, 2-ft. 8-in. × 2-in. × $\frac{3}{4}$-in.	1	..		
Iron, pieces — flat, 2-ft. 8-in. × 6$\frac{1}{4}$-in. × $\frac{1}{2}$-in.	1	1		
Iron, pieces — flat, 2-ft. 8-in. × 2-in. × $\frac{3}{8}$-in.	1	..		
Iron, pieces — plate, 1-ft. 6-in. × 6-in. (W.G. No. 12)	2	..		
Iron, pieces — tire, 12-in. × 2$\frac{1}{2}$-in. × $\frac{1}{2}$-in.	2	2		
Keys, pole pin, No. 17 pole	2	..	..	Store wagon.
Locks, spring, box, ammunition	1	1	..	Forge limber.
Pins, steel, taper, gear elevating	3	1	..	Forge limber.
Rivets, steel — boss head, $\frac{7}{16}$-in. × 1$\frac{1}{8}$-in.	18	6		
Rivets, steel — boss head, $\frac{7}{16}$-in. × $\frac{3}{4}$-in.	24	6	Movable steels	No. 3 drawer, wheelers' tool chest.
Rivets, steel — conical head, $\frac{3}{8}$-in. × 3-in.	10	4		
Rivets, steel — countersunk head, $\frac{1}{4}$ in. × 1$\frac{1}{2}$ in.	..	12	Per ammunition box, for fitting sides and ends.	No. 3 drawer, wheelers' tool chest.

Soles, drag shoe	No. 3	3	2		Store wagon.
	No. 5	3	3		
Staples, lashing	riveting, $\frac{5}{16}$-in.	5	2	Securing side arms	Forge limber.
	with plate, single box	2	..	Ammunition boxes	
Steel, pieces, tire, 12-in. × 3-in. × ½-in., curved		2	..	Ring tires	
Steels, movable	limber hook	3	3		
	trail eye, or perch	3	3		
Straps, securing	44-in. × 1-in...	2	..	Camp kettle lids, portable magazines	
	32 „ × 1 „ BP., C.B.	3	..	For blankets	
	30 „ × 1½-in. „ „	1	..	Drag shoe ammunition wagon	
	30 „ × 1 „ „ „	2	2	Drag rope and swingletree	
	26 „ × 1 „	2	..	Case for grease box and swords	
	22 „ × 1 „	1	..	Spades	Store wagon.
	22 „ × 1 „ D.L.	1	..	Handwheel	
	18 „ × 1 „	1	..	Pickaxe and tampeon	
	13 „ × 1 „	3	..	Pickaxe, drag, washers, bill-hook, water brush, and spanner, No. 93	
	13 „ × 1 „ with piece	1	..	Handspike on trail	
	13 „ × ¾ „	2	..	Box, telescopic sight	
	10 „ × 1 „	1	..	Camp kettle handles	
	10 „ × ¾ „	1	..	Posts, aiming	
	6 „ × ¾ „	2	..	Box, telescopic sight	
Turnbuckles, box, under wagon		2	..		Forge limber.

Woolwich Store Charge No. 14.

Keys, split, round, loop, head	⅜-in. × 2¾-in.	4	2		No. 3 drawer, wheelers' tool chest.
	$\frac{3}{16}$-in. × 2¼-in.	12	6		
	$\frac{3}{16}$-in. × 1¾-in.	12	6		
	$\frac{3}{16}$-in. × 1¼-in.	12	6		
	⅛-in. × 1¼-in.	6	6		

* Carried as convenient.

† Field Forge, Mark IV only.

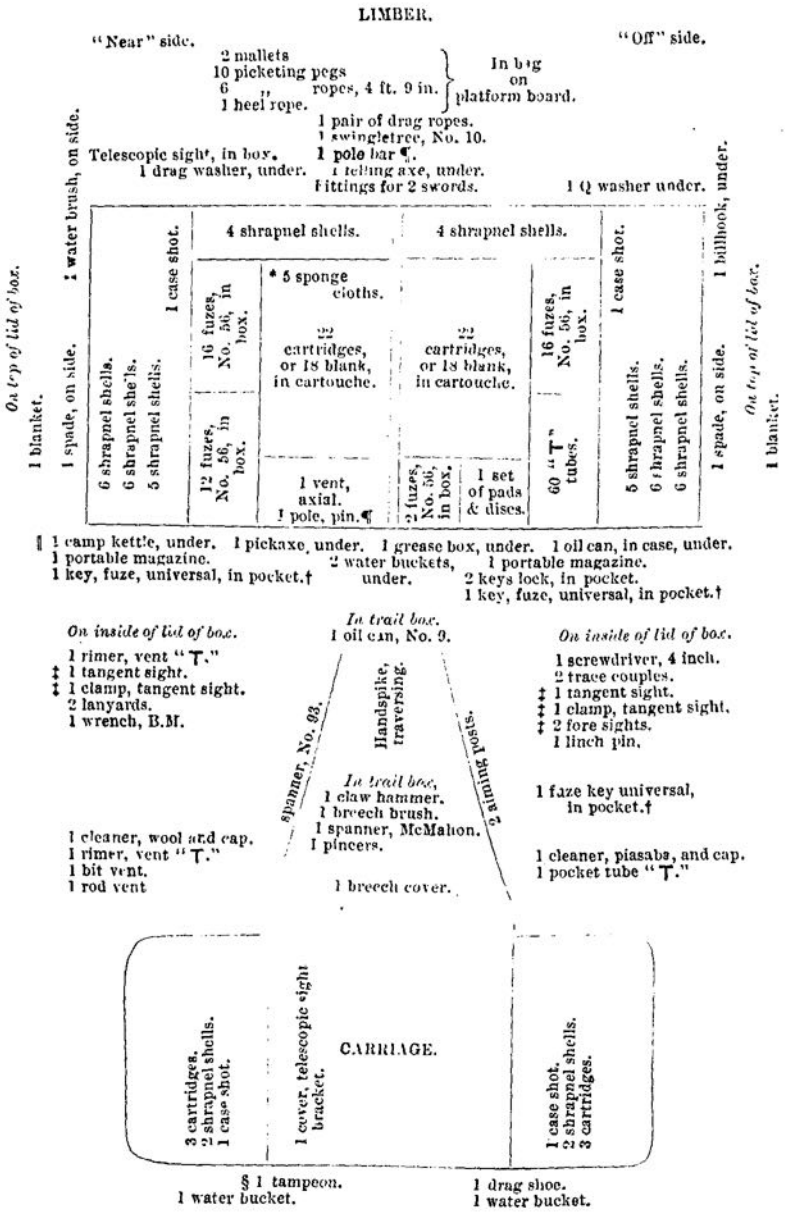
Description.	War. — Three Months' Supply.	For use in Peace. — Twelve Months' Supply. *	For what Purpose.	Where carried.
Woolwich Store Charge No. 14—continued.				
Keys, split, round, loop, head { ¼-in. { × 3¼-in.	12	6	.. ..	No. 3 drawer, wheelers' tool chest.
¼-in. { × 2¼-in.	12	6		
$\frac{1}{16}$-in. × ⅜-in.	12	6		
Woolwich Store Charge No. 19.				
Blocks, wood, securing, projectiles { limber { near, set of 9 .. sets	1	½	.. ..	Store wagon.
off, set of 9 .. .. „	1	½		
wagon { near, set of 7 .. „	1	½		
off, set of 7 .. .. „	1	½		
Boxes, ammunition { limber { ends	—	as required	Repair of ammunition boxes.	
sides	—			
wagon { ends	—			
sides	—			
Felloes { No. 35A wheel { ordinary	3	1	.. ..	
slip	2	1		
„ 36 „ { ordinary	1	..		
slip	1	..		
Spokes { No. 35A wheel { back	3	1		
front	3	1		
„ 36 „	2	..		

* Carried as convenient.

A

DIAGRAM OF PACKING.

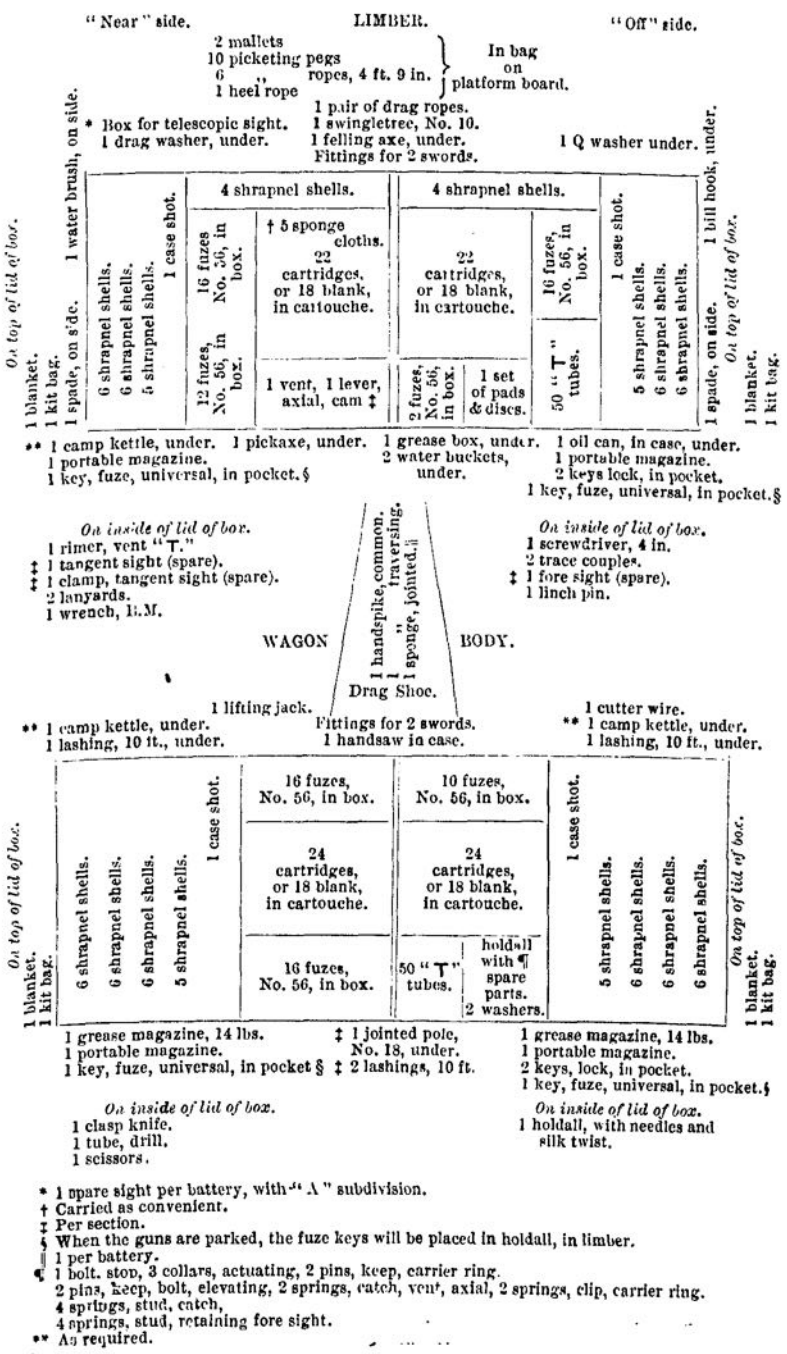
12-PR. B.L. 6-CWT. EQUIPMENT CARRIAGE AND LIMBER.



* Carried as convenient.
† When the guns are parked, the fuze keys will be placed in holdall, in limber.
‡ When not in gun.
§ Strapped to axletree, when not in gun.
‖ As required.
¶ Per section.

DIAGRAM OF PACKING. A

12-PR. B.L. 6-CWT. EQUIPMENT WAGON AND LIMBER.

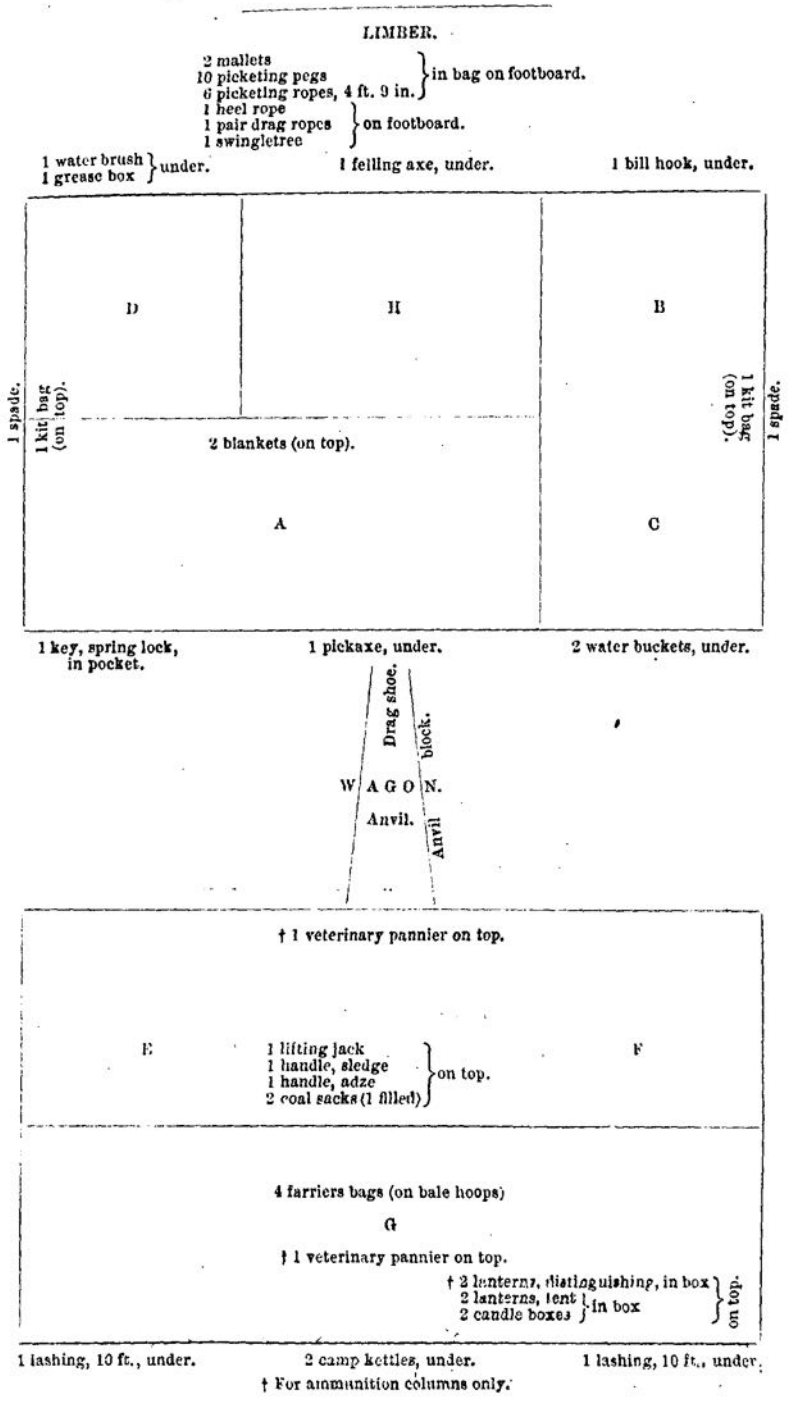


* 1 spare sight per battery, with "A" subdivision.
† Carried as convenient.
‡ Per section.
§ When the guns are parked, the fuze keys will be placed in holdall, in limber.
‖ 1 per battery.
¶ 1 bolt, stop, 3 collars, actuating, 2 pins, keep, carrier ring.
2 pins, keep, bolt, elevating, 2 springs, catch, vent, axial, 2 springs, clip, carrier ring.
4 springs, stud, catch,
4 springs, stud, retaining fore sight.
** As required.

B

WAGONS, FORGE, R.A., MARKS I* AND II.

(Packed for 12-pr. 6 cwt. B.L. Equipment.)



† For ammunition columns only.

B

COMPARTMENT "A" (Bottom of Limber Box).

Dubbing	lb. 28	Oil, rape	pt. 36
Glue	,, 1	Soap, soft	lb. 14
Oil, olive	pt. 6	Wax, black	oz. 25
Oil, rangoon	,, 12		

COMPARTMENT "B" (Bottom of Limber Box).

Oil, rape ... ... 32 pints.

TRAY "C."

Vice, bench	1	Cards, towsing	2

TRAY "D."

Couples, trace	2	Pins { taper, gear elevating ...	3
Chain, weldless link	1	pole and keys	3
Keys { capsquare	2	linch	1
guard iron	4	Staples { round, crowned ...	6
Locks { spring	1	lashing $\frac{5}{16}$-in.	5
pad	1	with plate	2
		Turnbuckles	2
		Washer, drag	1

TRAY "A."

Bolts, elevating 6

COMPARTMENT "H."

Nil.

COMPARTMENT "E" (Wagon).

Set of smiths' tools; set of tinmen's tools; forge and shoeing tools (farriers'); with borax, resin, solder, sal-ammoniac, spelter, sawyers' wedges, sponge cloths, and handbooks "Military Artificer's" (also handle, lever, when Mark IV forge is carried).

COMPARTMENT "F" (Wagon).

Set of wheelers' tools; with bolts, nails, keys loop, rivets, and screws (also 8 basil aprons on top of tool chest).

COMPARTMENT "G" (Wagon).

*Forge (with poker and slice)	1	Hammers, sledge { farriers'	2
Grindstone, 10-in.	1	smiths'	1
		Tongs, farriers', fire	

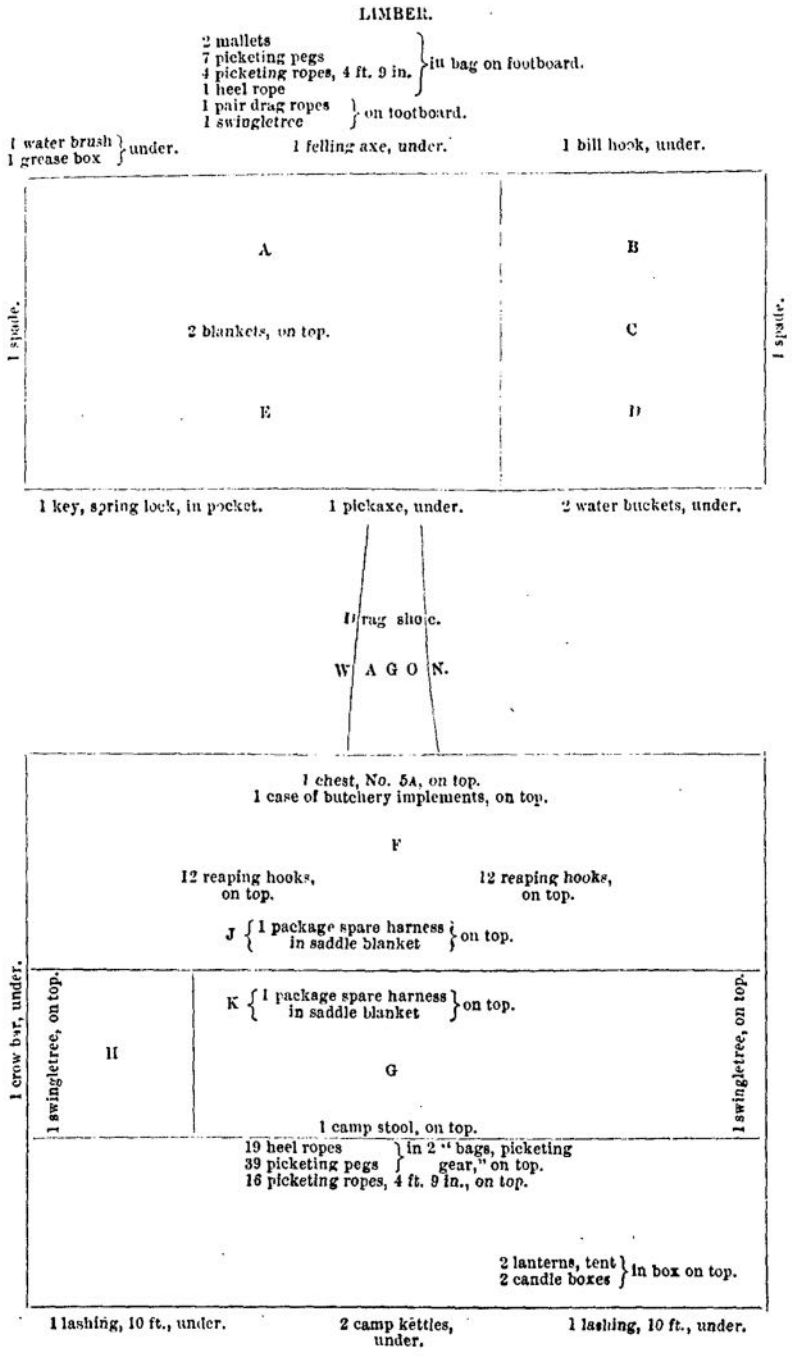
---

* The Mark I* wagon carries the Mark II G.S. field forge; the Mark II wagon carries either the Mark II G.S. field forge, or the Mark IV R.A. field forge.

C

WAGON, STORE, R.A., MARK I.

(Packed for 12-pr. B.L. 6 cwt. equipment.)



C

COMPARTMENT "A" (Bottom of Limber Box).

Soap, yellow, 74 bars.

COMPARTMENT "B" (Bottom of Limber Box).

Oil, rangoon, 2 pints.

LOWER TRAY "C."
(In two boxes.)

Buckles.
Chains, bridoon.
Dees.
Plates.
Rivets.
Screws.
Staples.
Washers.
Tallow ... lb. 6.
Tacks.

UPPER TRAY "D."

Couples, trace	...	...	8	Pin, linch	...	...	1	Handcuffs, pairs	...	...	2
Locks, pad...	...	...	3	Stone, rub	...	...	1	Wire, iron, soft	...	oz.	2
								Washer, drag	...	...	1

COMPARTMENT "E."

Soap, yellow ... bars 20 Tow, coarse ... lbs. 6

COMPARTMENT "F" (WAGON).

Arches	universal	...	2	Felloes	No. 35A...	...	5	Steels	limber hook	...	3
	drivers'	...	2		,, 36 ...	...	2		trail eye...	...	3
Bars	universal...	...	2	Hammer, sledge	...	...	1	Chains			
	drivers' ...	...	2	Hooks, draught	...	...	2	Corks	water	...	5
Basils	strained ...	...	1	Hides, various.				Covers	bottle	...	9
	unstrained	...	3	Keys, limber hook		...	1			...	9
Blankets, old	...	lbs.	12	Linen, old ...	...	lb.	3½	Thread, flax	...	oz.	32
Chains, brake shoe		...	4	Ropes, wire ...	...	...	2	Twine	quilting ...	,,	8
Cordage	white ...	fms.	4	Shackles, wire	...	...	2		packing ...	,,	12
	hawser...	,,	56	Shoes	brake ...	...	2	Straps, various	...	...	23
Cord	cotton ...	yds.	8		drag, No. 3	...	1	Felt, brown	...	lbs.	6
	whip ...	lbs.	1½	Soles, drag shoe	No. 3		3	Canvas, sail	...	yds.	2
					,, 5		3				

COMPARTMENT "G" (WAGON).

Bracket, sight, telescopic ... 3
Ring, carrier ... ... 1 } in tray.
Screw, breech 1

Blocks, wood	...	...	32	Iron, 2 ft. 8 ins., flat	...	...	4
Iron, 2 ft. 8 ins., bolt		...	4	Spokes No. 35A	...	...	6
				,, 36	...	...	2

COMPARTMENT "H" (WAGON).

Capsquares	...	...	...	2	Steel, tire	...	...	...	...	2
Iron	tire	...	...	1							
	plate, 1 ft. 6 in.		...	2							

COMPARTMENT "I" (WAGON).

Stationery.

CONTENTS OF PACKAGE "J."

Bits, portmouth, reversible	Mark II...	...	...	4
	heads, bridle	...	...	2
Chains, hame ...	...	...	...	3
Leggings, drivers'	...	...	...	2
Rings, iron, 3-inch	...	...	...	4
Traces, harness	short	...	pair	2
	wheel	...	,,	1
Whips, drivers'	...	...	...	6
Bits	bridoon	...	...	4
	portmouth, saddlery	...	...	1
	portmouth, chains, curb	...	...	6
	portmouth, hooks, curb	...	...	12
Irons, stirrup, G.S.	...	...	...	6
Leathers, stirrup	...	...	...	4
Pads, collar, zinc (2 per team).				
Straps, collar, pad (2 per pad).				

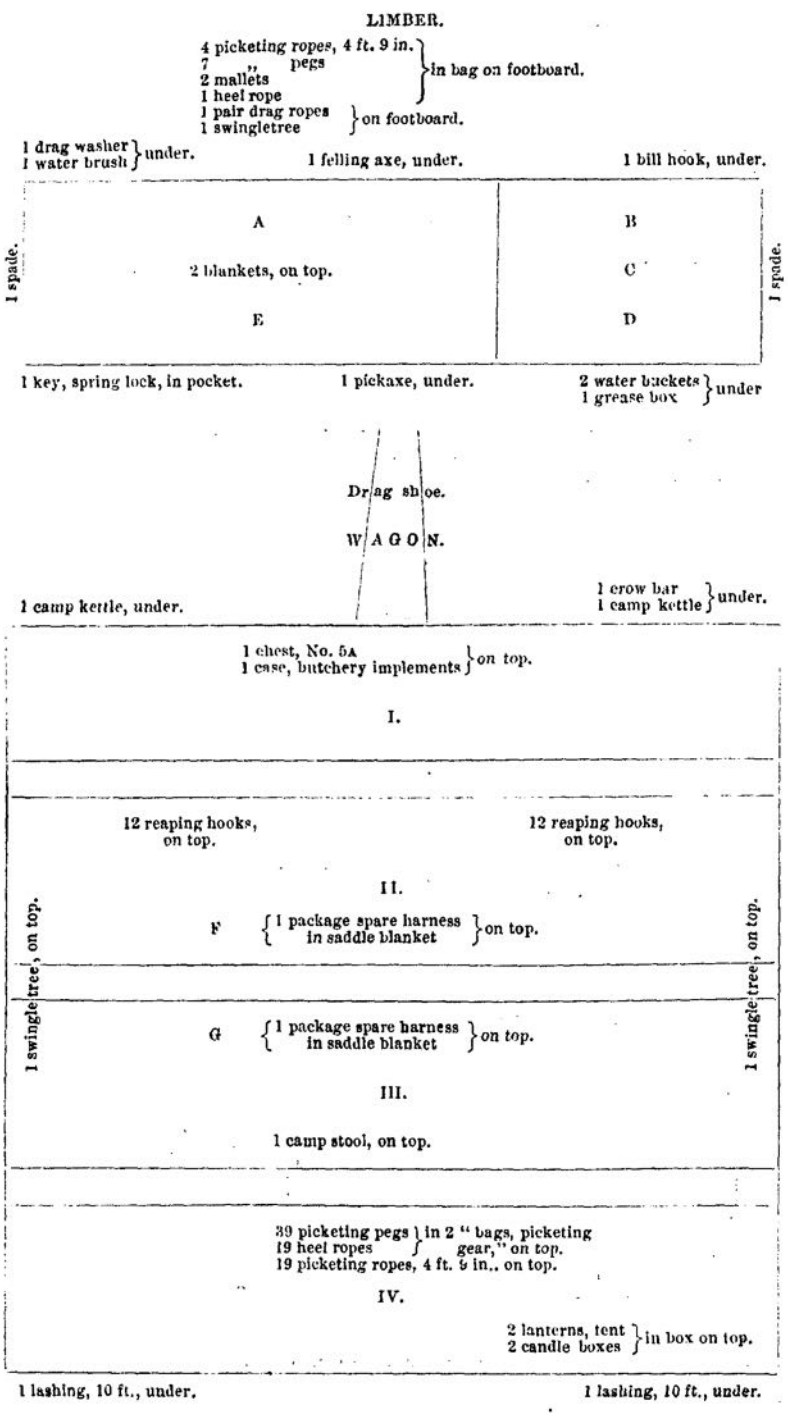
CONTENTS OF PACKAGE "K."

Breechings	...	...	...	1
Collars, head, R.A.	...	...	...	3
Girths, leather	...	...	...	7
Hames ...	...	...	... pairs	3
Hooks, crupper	...	...	...	3
Pieces, buckling, 1¼ inch	...	...	...	2
Reins, bearing	...	...	...	4
Reins, side	...	...	...	2
Runners, stirrup leather	...	...	...	6
Straps, breast, breechings...		...	...	2
Straps, flank...	...	...	...	4
Straps, hame	...	...	...	3
Straps, wither, 1¼-inch	...	...	...	2
Straps, pole, bar	...	...	...	6
Straps, cloak and wallet	...	...	...	2
Straps, shoe, case	...	...	...	1
Surcingles, leather harness		...	...	2

NOTE.—Each package wrapped in saddle blanket and secured by a stirrup leather.

D

WAGON, STORE, R.A., MARK II.
(Packed for 12-pr. 6 cwt. B.L. Equipment.)



D

COMPARTMENT "A" (Bottom of Limber Box).

Soap yellow, 94 bars.

COMPARTMENT "B" (Bottom of Limber Box).

Oil, rangoon, 2 pints.

LOWER TRAY "C."

(In two boxes.)

Buckles.
Chains, bridoon.
Dees.
Plates.
Rivets.
Screws.
Staples.
Tacks.
Tallow lb. 6.
Washers.

UPPER TRAY "D."

Couples, trace	...	...	8	Pin, linch	...	...	1	Handcuffs ... ... prs. 2
Locks, pad	...	...	3	Stone, rub	...	...	1	Wire, iron, soft ... ... oz. 2

COMPARTMENT "E."

Tow, coarse ... ... lbs. 6

BOX I (WAGON).

Arches	universal	...	2	Felloes, No. 35A	...		5	Shoes, brake 2
	drivers'	...	2	Felloes, No. 36...	...		2	Soles, drag shoe No. 3 3
Bars	universal	...	2	Hammer, sledge	...		1	No. 5 3
	drivers' ...	...	2	Hooks draught	...		2	Steels limber hook ... 3
Canvas, sail	...	...yds.	2	Keys, limber hook	...		1	trail eye 3
Chains, brake shoe	...		4	Ropes, wire ...	...		2	Straps, various 23
Cordage	white ...	fms.	4	Shackles, wire ...	...		2	
	hawser	... ,,	56					

BOX II (WAGON).

Basils, unstrained	...		3	Cord	cotton...	...yds.	8	Shoe, drag, No. 3 ... 1
Blankets, old	...	... lb.	12		whip ...	... lb.	1	Thread, flax ... ... oz. 32
Chains, Corks, Covers, water bottle		...	5	Felt, brown	...	... ,,	6	Twine quilting ... ... ,, 8
		...	9	Hides, various.				packing ... ... ,, 12
		...	9	Linen, old ...		... lb.	3½	

BOX III (WAGON).

Bracket, sight, telescopic ... 3
Ring, carrier 1
Screw, breech... 1
} in tray.

Blocks, wood	...	...	32	Iron, 2 ft. 8 in.	bolt ...		4	Steel, pieces, tire... ... 2
Capsquare ...	...	...	2		flat ...		4	Spokes No. 35A ... 6
Iron	tire ...	...	1	Steel, 1 ft. 4 in. × 1½ in.			1	No. 36... ... 2
	plate, 1 ft. 6 in.	...						

BOX IV (WAGON).

Stationery.

CONTENTS OF PACKAGE "F."

Bits, portmouth, reversible	Mark II	... ...		4
	heads, bridle	... ...		2
Chains, hame	... ...		...	3
Leggings, drivers'	... ...		...	2
Rings, iron, 3-inch	... ...		...	4
Traces, harness	short, ...		pairs	2
	wheel... ...		,,	1
Whips, drivers'	... ...		...	6
Bits	bridoon		...	4
	portmouth saddlery	...	...	1
	portmouth chains, curb	...	...	6
	portmouth hooks, ,,	...	...	12
Irons, stirrup, G.S....	... ...		...	6
Leathers, stirrup	... ...		...	4
Pads, collar, zinc (2 per team).				
Straps, collar pad (2 per pad).				

CONTENTS OF PACKAGE "G."

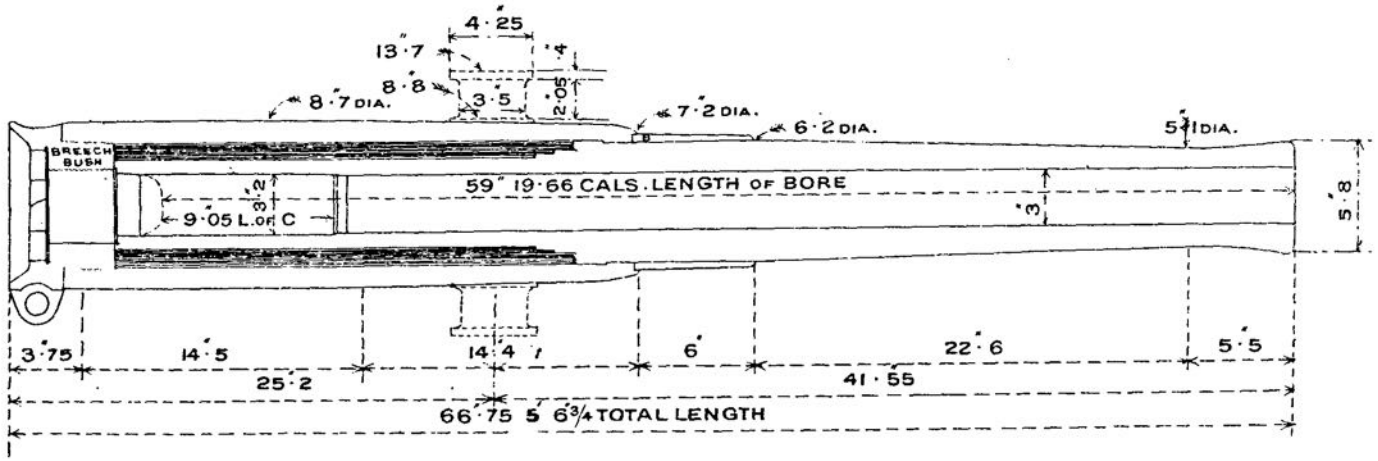
Breechings	...		1
Collars, head, R.A.	... ...		3
Girths, leather	... ...		7
Hames	...	pairs	3
Hooks, crupper	...		3
Pieces, buckling, 12 in.	... ...		2
Reins bearing	... ...		4
Reins slide	... ...		2
Runners, stirrup leather	... ...		6
Straps breast breeching	... ...		2
Straps flank	... ...		4
Straps hame	... ...		3
Straps wither, 1½ in.	... ...		2
Straps pole bar	... ...		6
Straps cloak and wallet	... ...		2
Straps shoe case, patt. '84	... ...		1
Surcingles, leather harness	... ...		2

NOTE:—Each package wrapped in saddle blanket and secured by a stirrup leather.

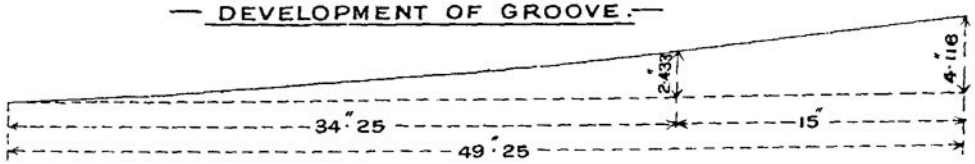
LONDON:
Printed for Her Majesty's Stationery Office,
BY HARRISON AND SONS, ST. MARTIN'S LANE,
Printers in Ordinary to Her Majesty.
(Wt. 21984 1500 1 | 99—H & S 2358)

ORDNANCE, B.L. 12-PR., 6 CWT.

— SCALE 1/10. —



— DEVELOPMENT OF GROOVE. —



SECTION OF GROOVE

FULL SIZE

Nº OF GROOVES 18.

RIFLING A UNIFORMLY INCREASING TWIST FROM 1 TURN IN 105 CALIBRES AT BREECH END OF RIFLING TO 1 TURN IN 28 CALS. AT 15" FROM THE MUZZLE, THE REMAINING 15" BEING UNIFORM AT 1 TURN IN 28 CALS.

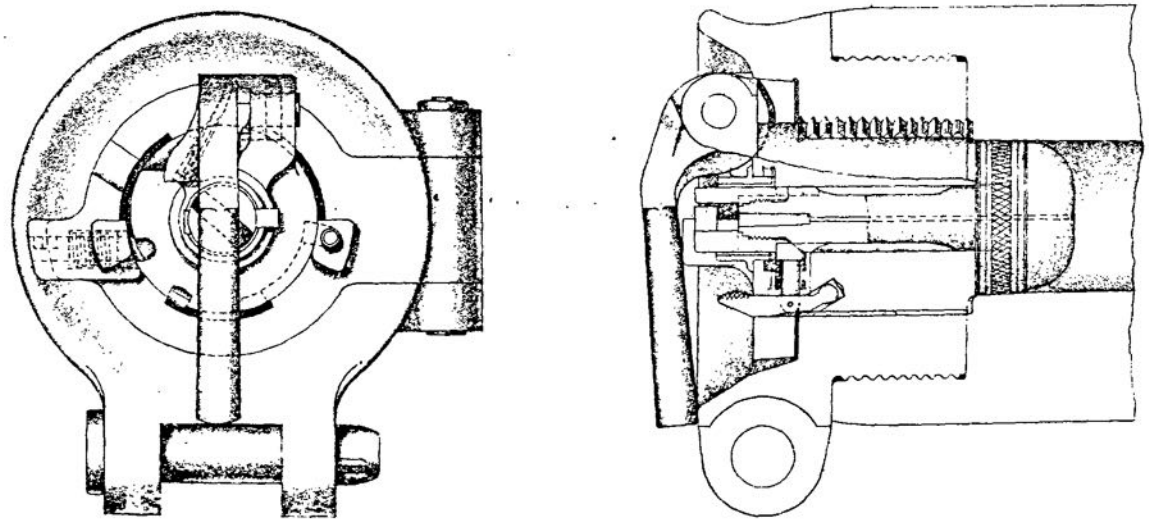
Plate I.

Wyman & Sons, Ltd. Lith. 31/10/99.

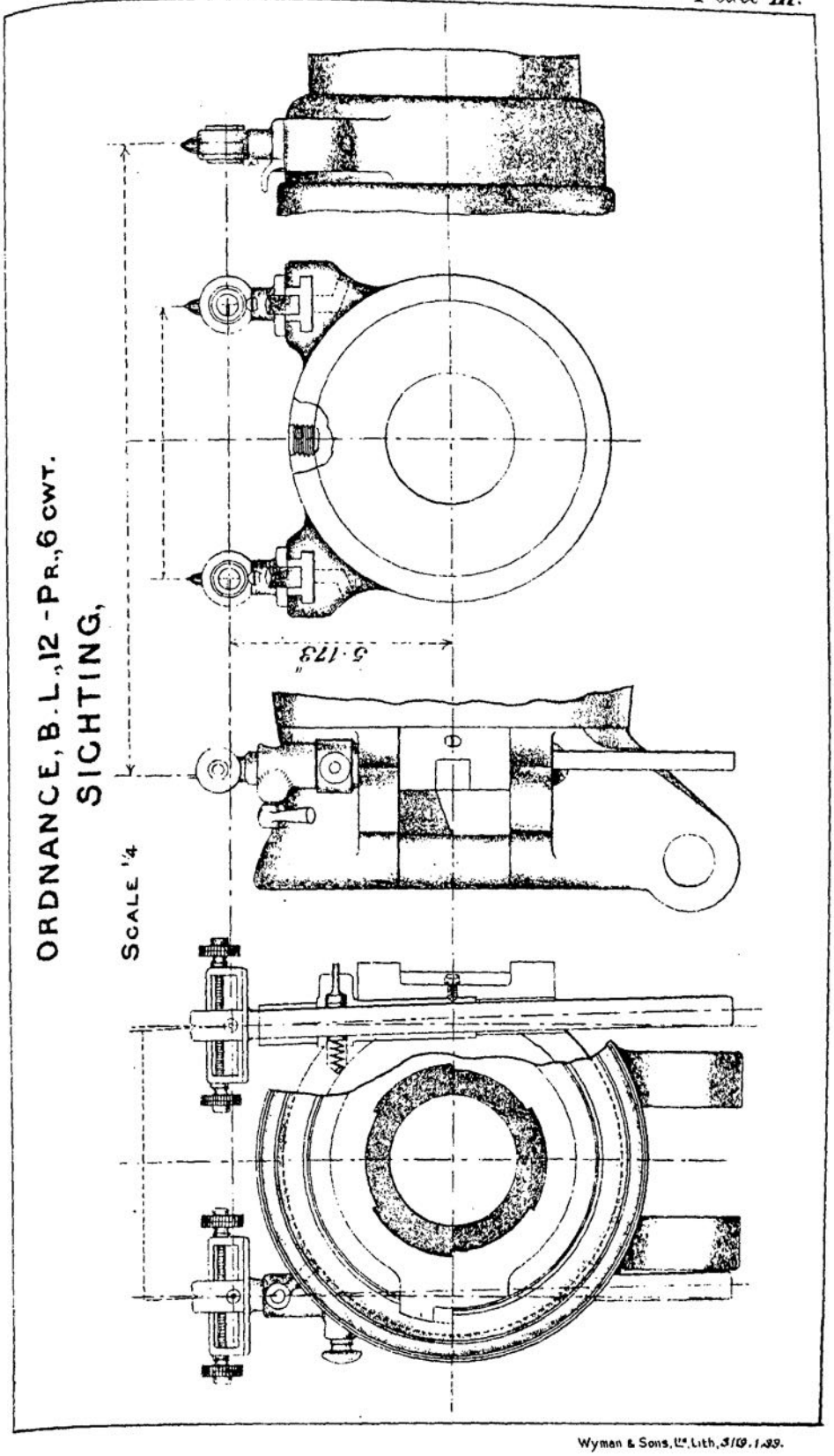
ORDNANCE., B.L., 12-Pr., 6-CWT.

GENERAL ARRANGEMENT OF BREECH MECHANISM

SCALE 1/4

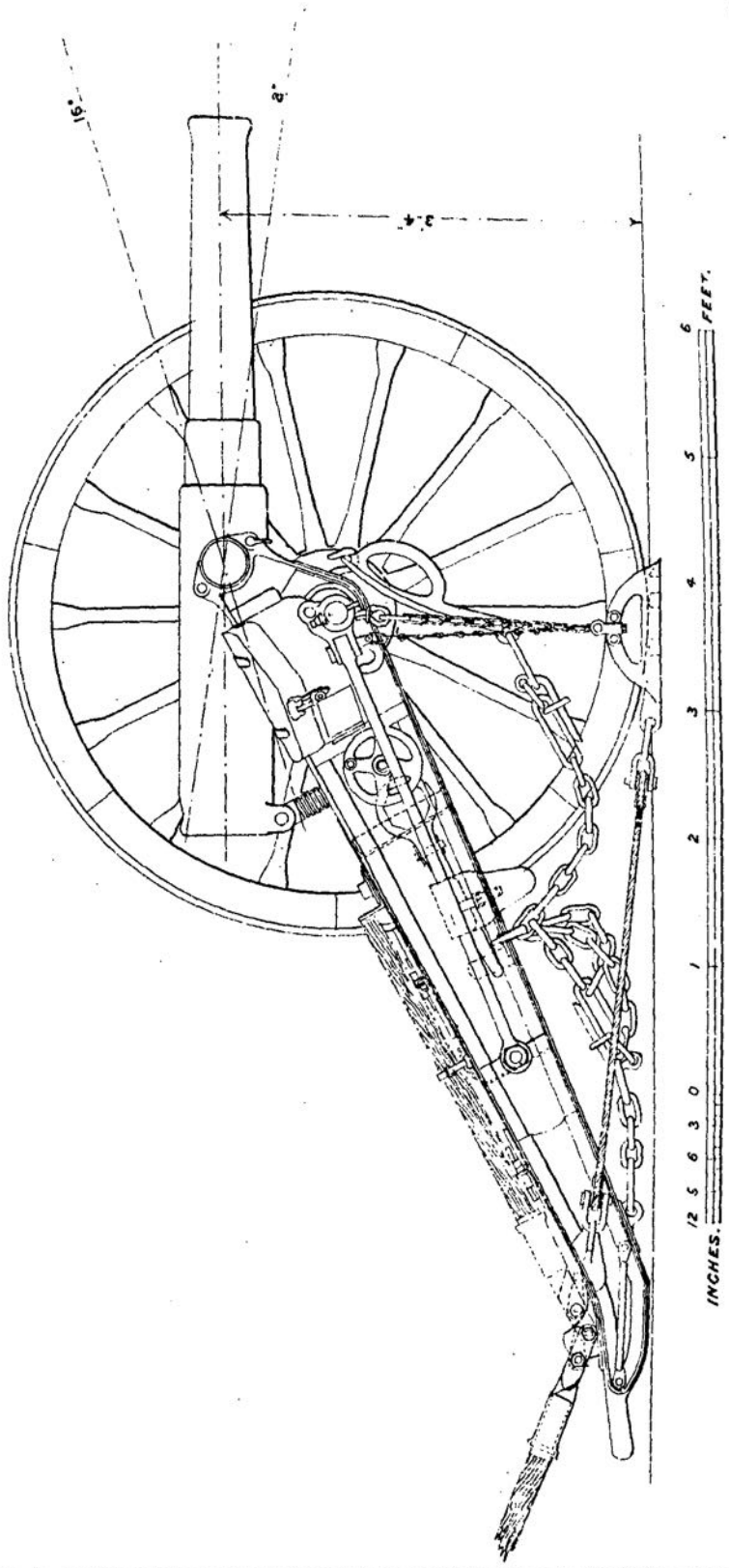


Wyman & Sons, Ltd. Lith. 3/19 1. 99



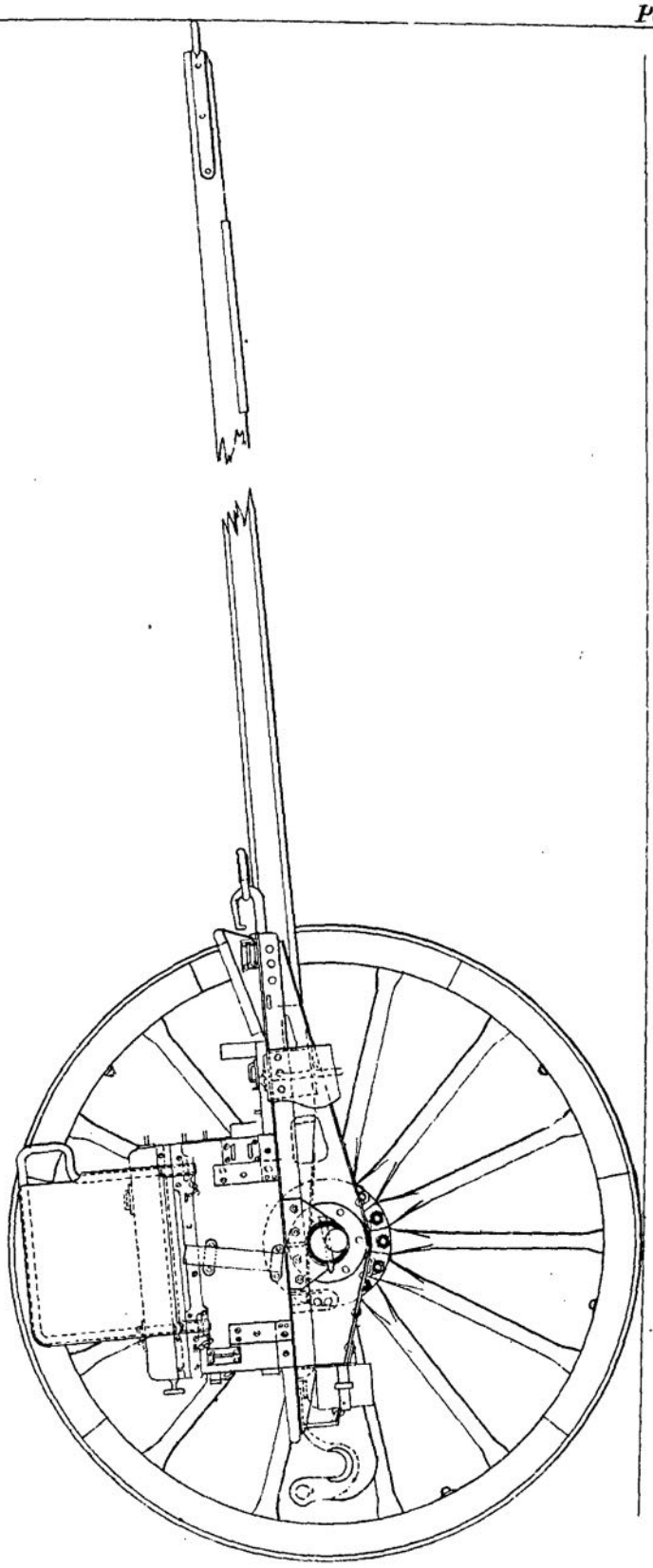
Wyman & Sons, Lt.d. Lith. 3/19. 1.23.

CARRIAGE, FIELD, B.L., 12 PR., 6 CWT.



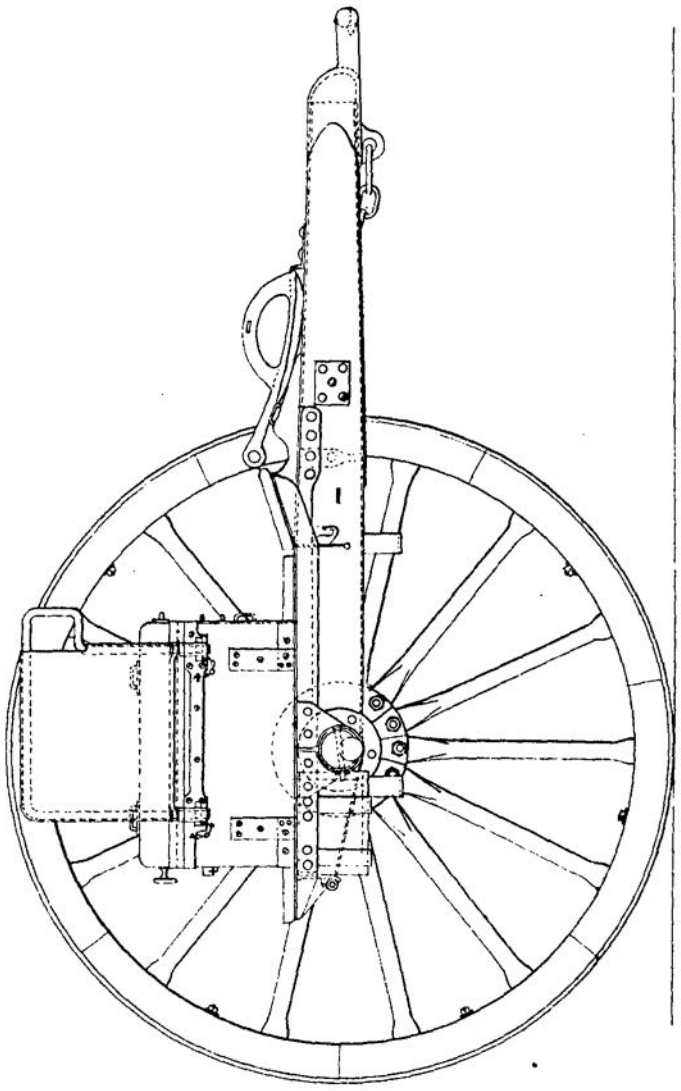
Wyman & Sons, Ltd. Lith 3/19/1.99.

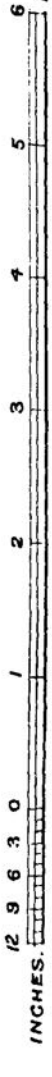
LIMBER, FIELD, B.L., 12 PR., 6 CWT.



Wyman & Sons Lt. Lith. 3118.1.39.

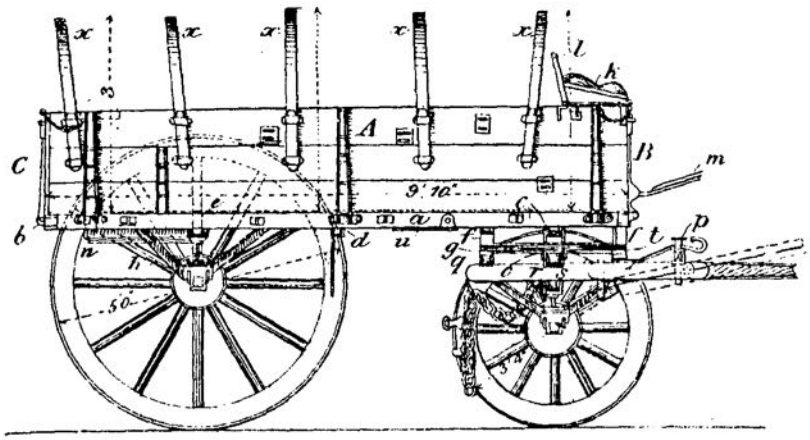
WAGON, AMMUNITION, B.L., 12 PR., 6 CWT.





Wyman & Sons, Ltd. Lith. 3119.1.99

WAGON, AMMUNITION & STORE, R.A., MARK II*

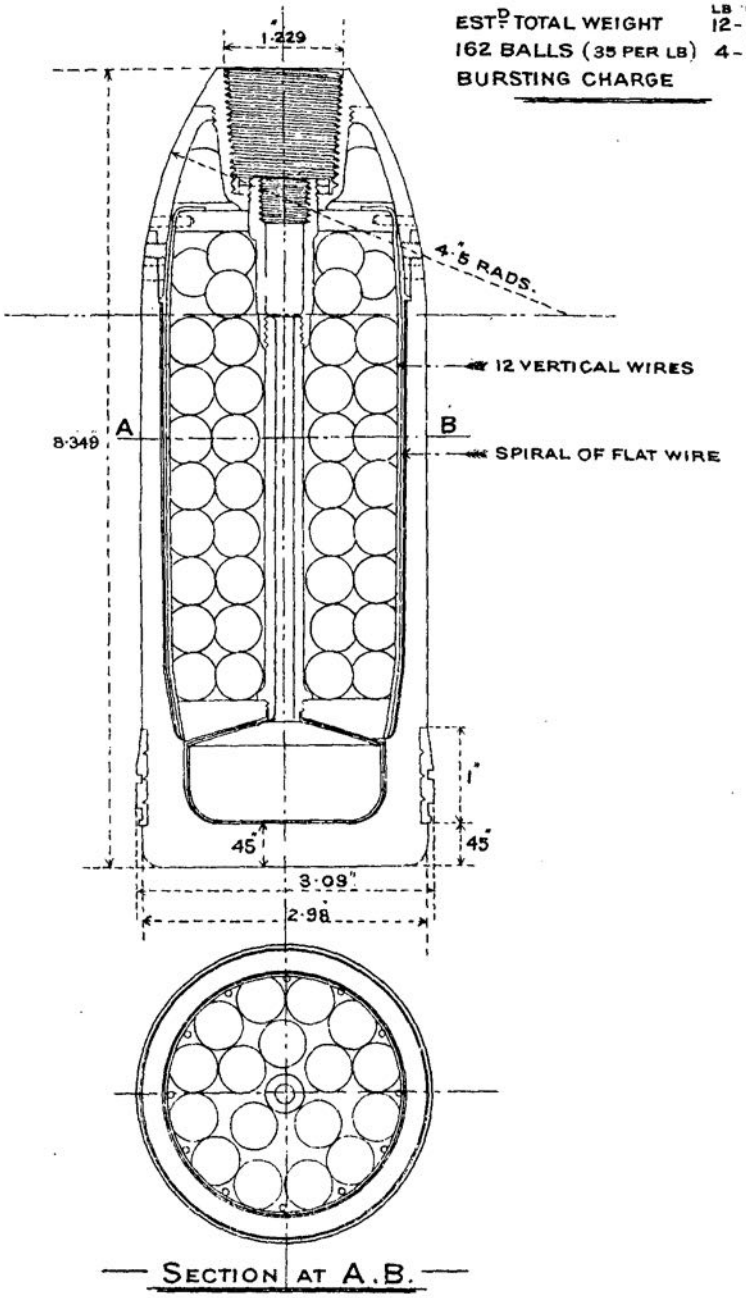


Wyman & Sons Ltd Lith 3/19./99.

SHELL, B.L. OR Q.F., SHRAPNEL, 12 PR, 12, 8 & 6 CWT MARK II.

— SCALE $\frac{1}{2}$ —

	LB	OZ
EST^{D} TOTAL WEIGHT	12	8
162 BALLS (35 PER LB)	4	10
BURSTING CHARGE		$\frac{1}{2}$



— SECTION AT A.B. —

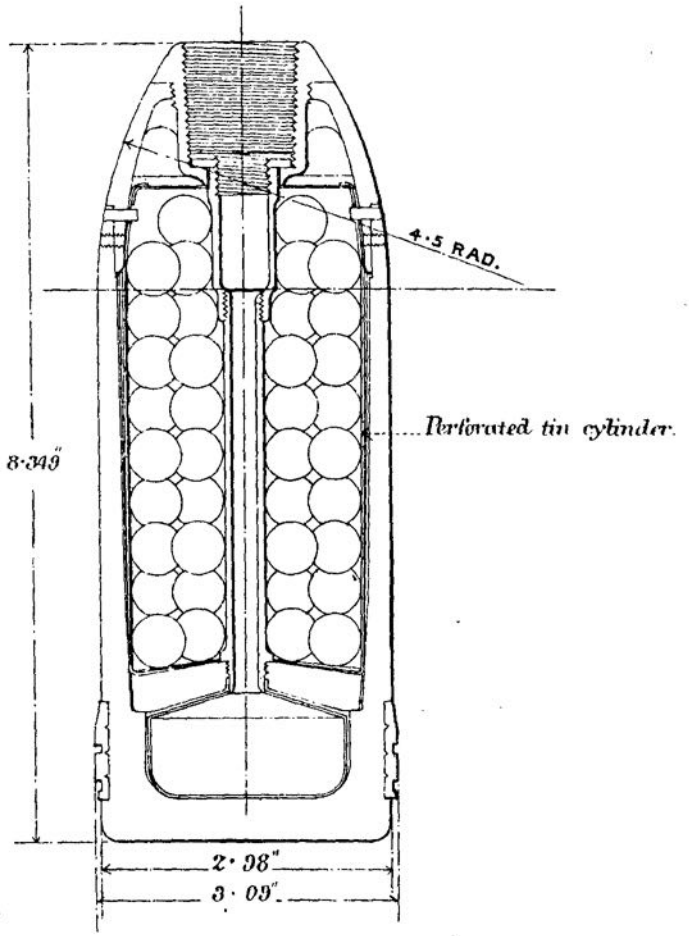
Wyman & Sons, Lt^{d}, Lith. 3118.1.98.

SHELL, B.L. OR Q.F. SHRAPNEL 12 PR 12, 8 AND 6 CWT (MARK III)

FORGED STEEL

SCALE ½

AVERAGE TOTAL WEIGHT 12 LB, 8 OZ.

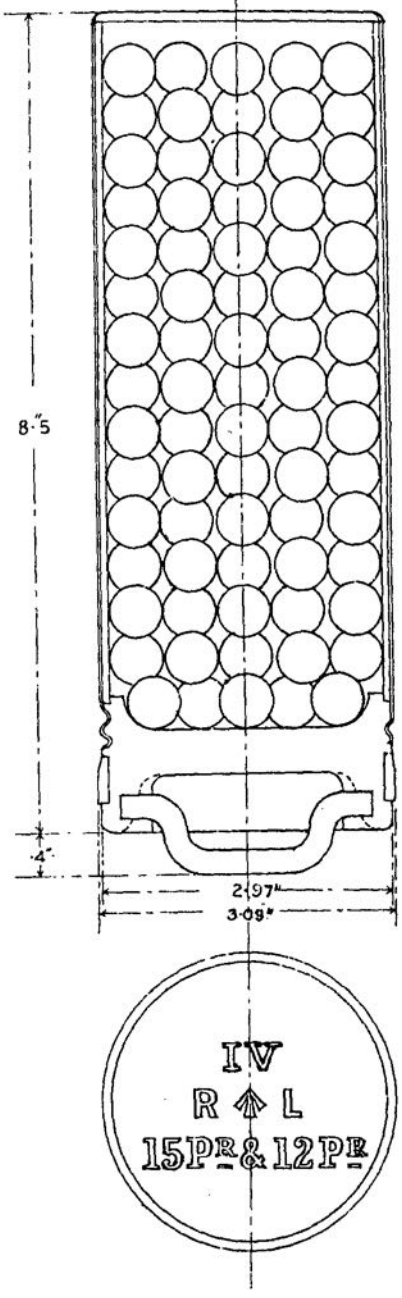


Wyman & Sons, Lt., Lith. 3119·1·99

SHOT, B.L. OR Q.F., CASE, 15 PR AND 12 PR, MARK IV.

SCALE ½

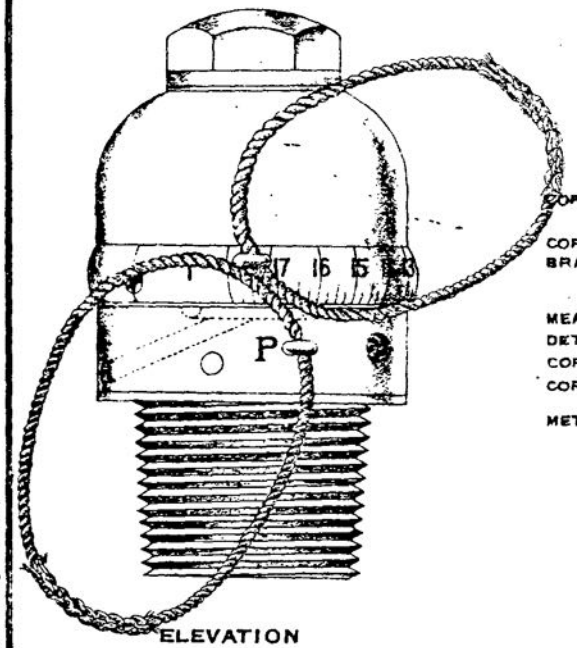
TOTAL WEIGHT 12 LB 14 OZ.



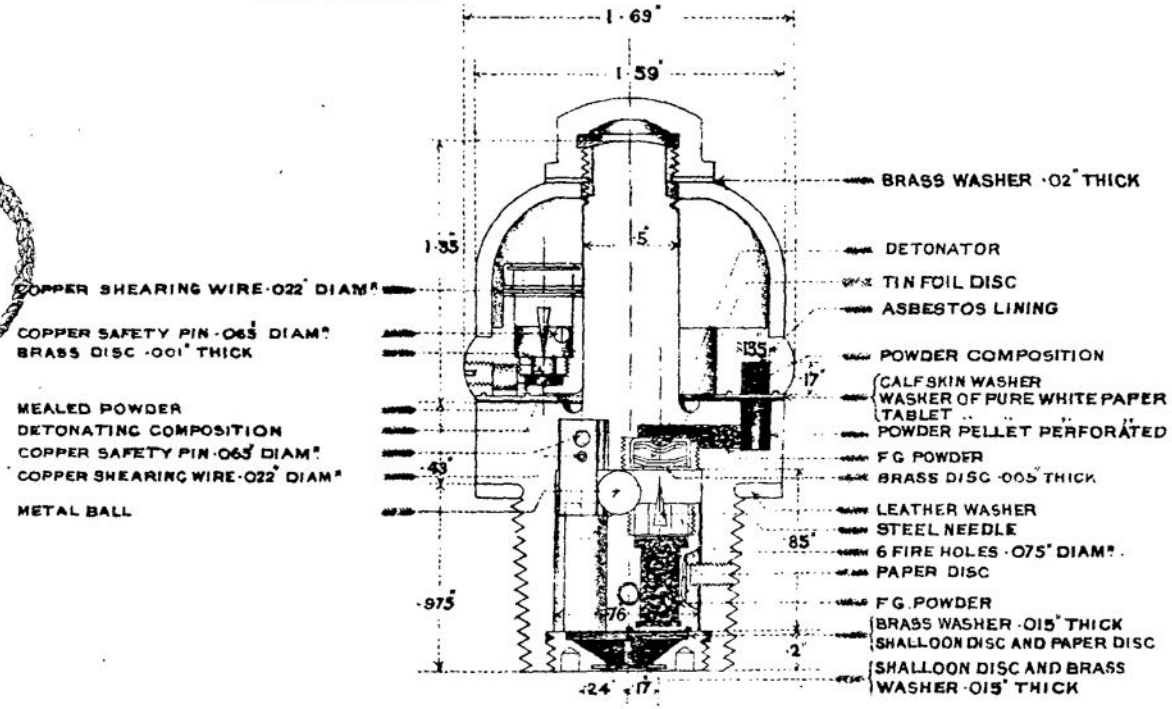
Wyman & Sons, Ltd., Lith. 10.608. 6.98.

FUZE, TIME AND PERCUSSION, No. 56 (MARK IV.)

FULL SIZE.



ELEVATION



SECTION

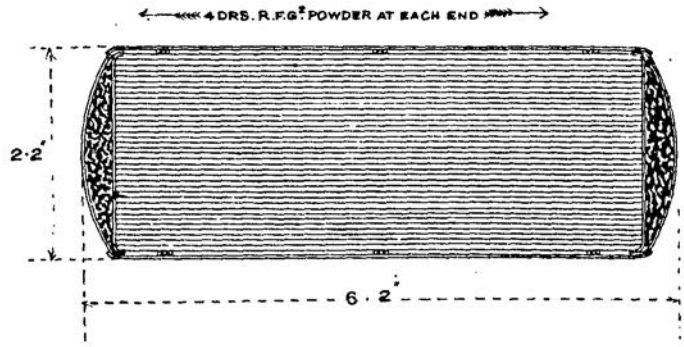
Wyman & Sons, Ltd. Lith 10.608.6.38.

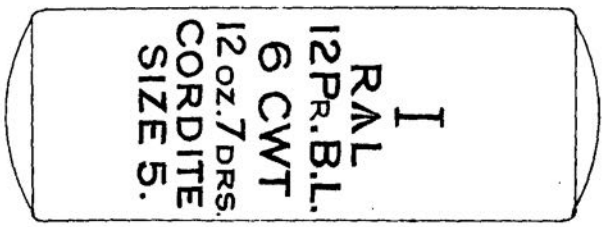
Plate XI

CARTRIDGE, B.L., 12 PR 6 CWT., 12 OZS. 7 DRS., CORDITE, SIZE 5., MARK I.

SHALLOON.

— Scale 1/2. —





Wyman & Sons, Ltd. Lith. 3/19

TUBE, FRICTION T. MARK II.

BRASS: FOR USE WITH CORDITE.

FULL SIZE.

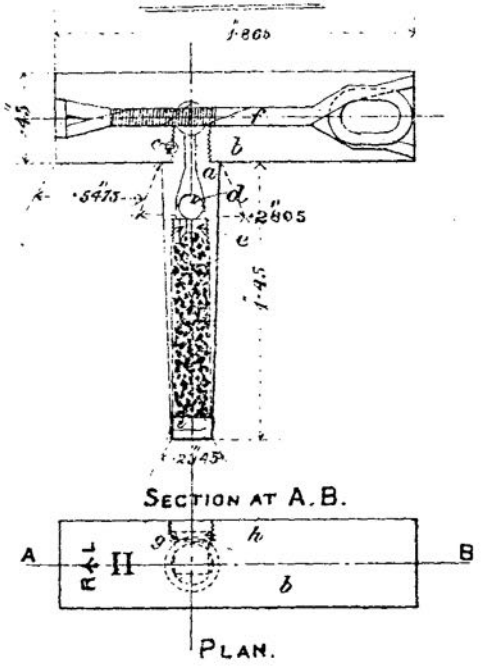
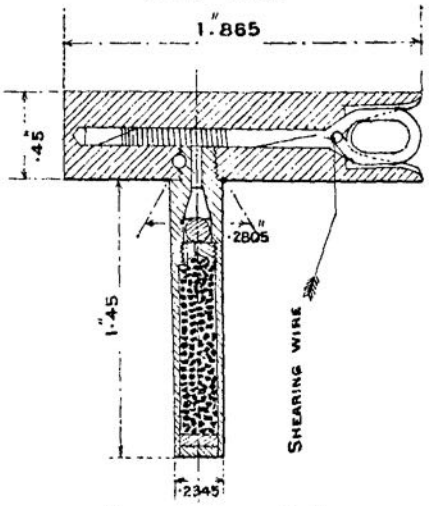


Plate XIII.

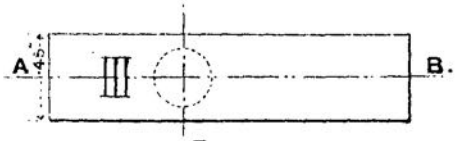
Wyman & Sons, Ltd. Lith. 3/19 1,499

TUBE, FRICTION T, MARK III.

Full size.



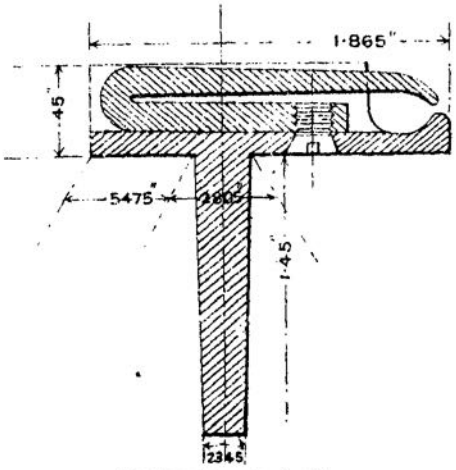
SECTION AT A.B.



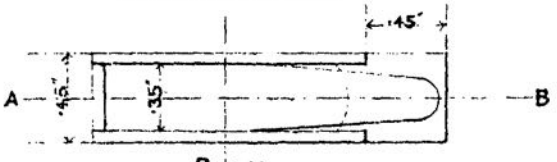
PLAN.

TUBE, FRICTION, T, DRILL, MARK I.

Full Size.

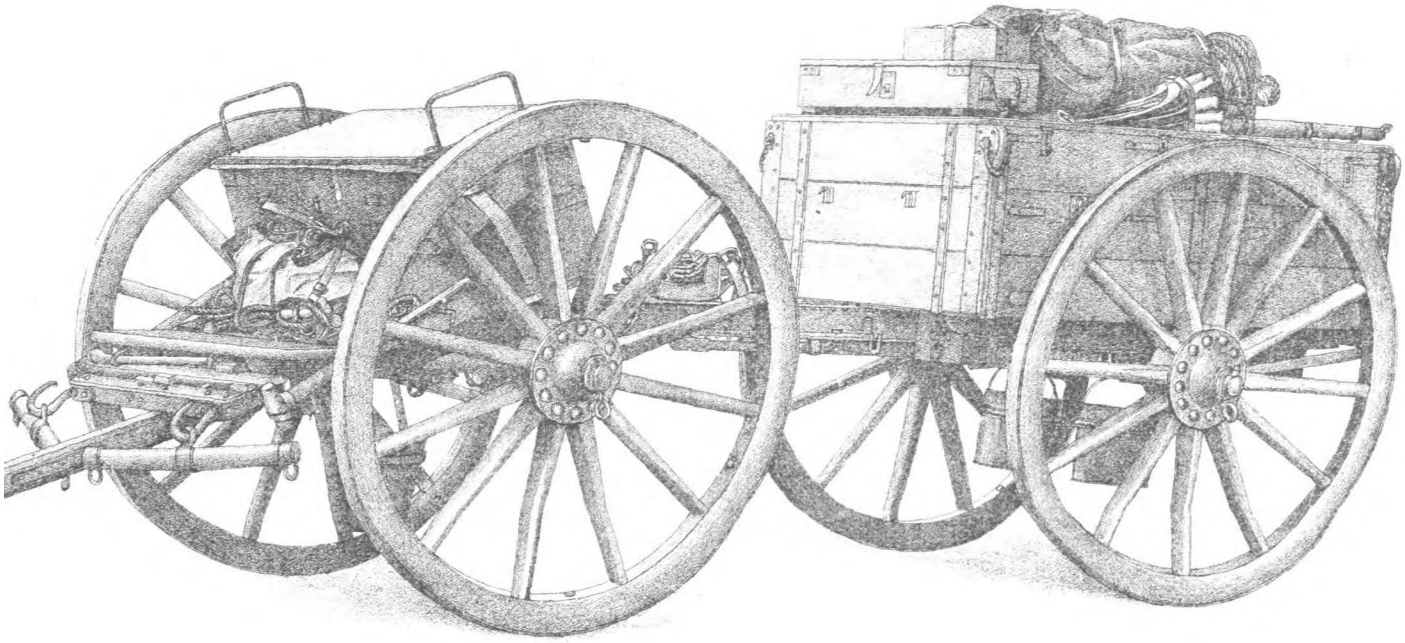


SECTION AT A. B.



PLAN.

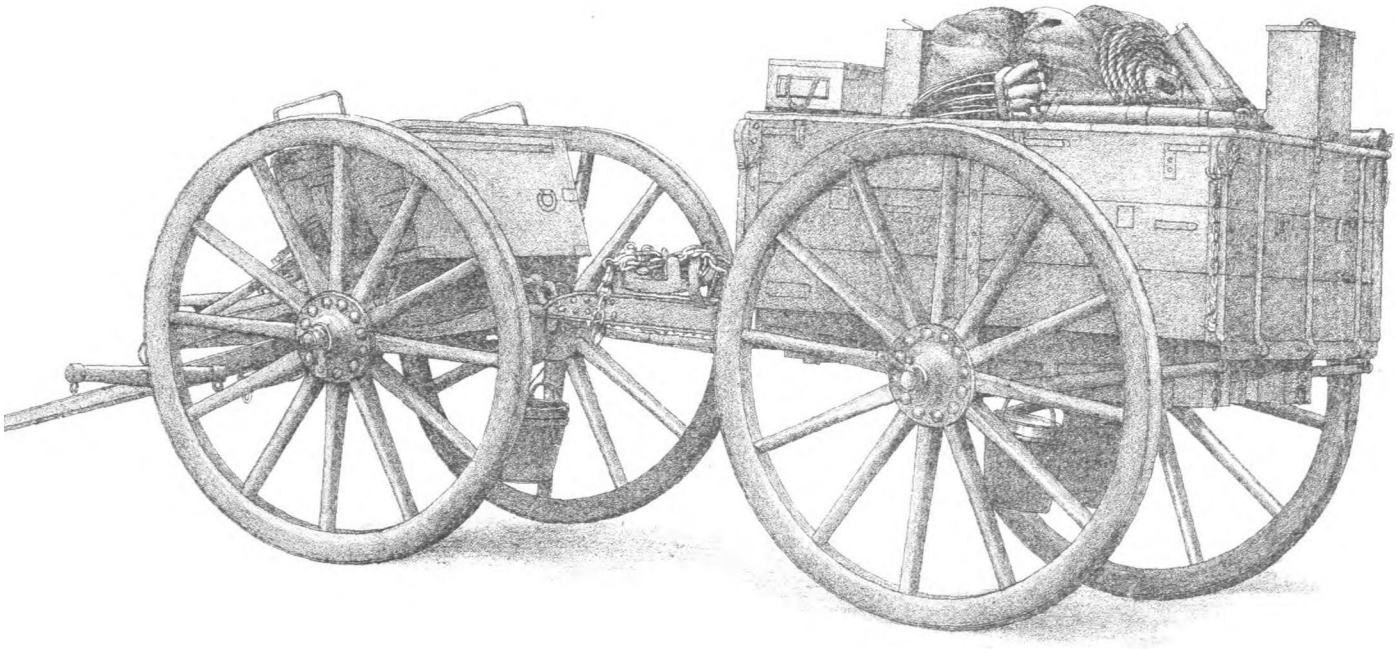
Wyman & Sons, Ltd. Lith 3119 .1. 99.

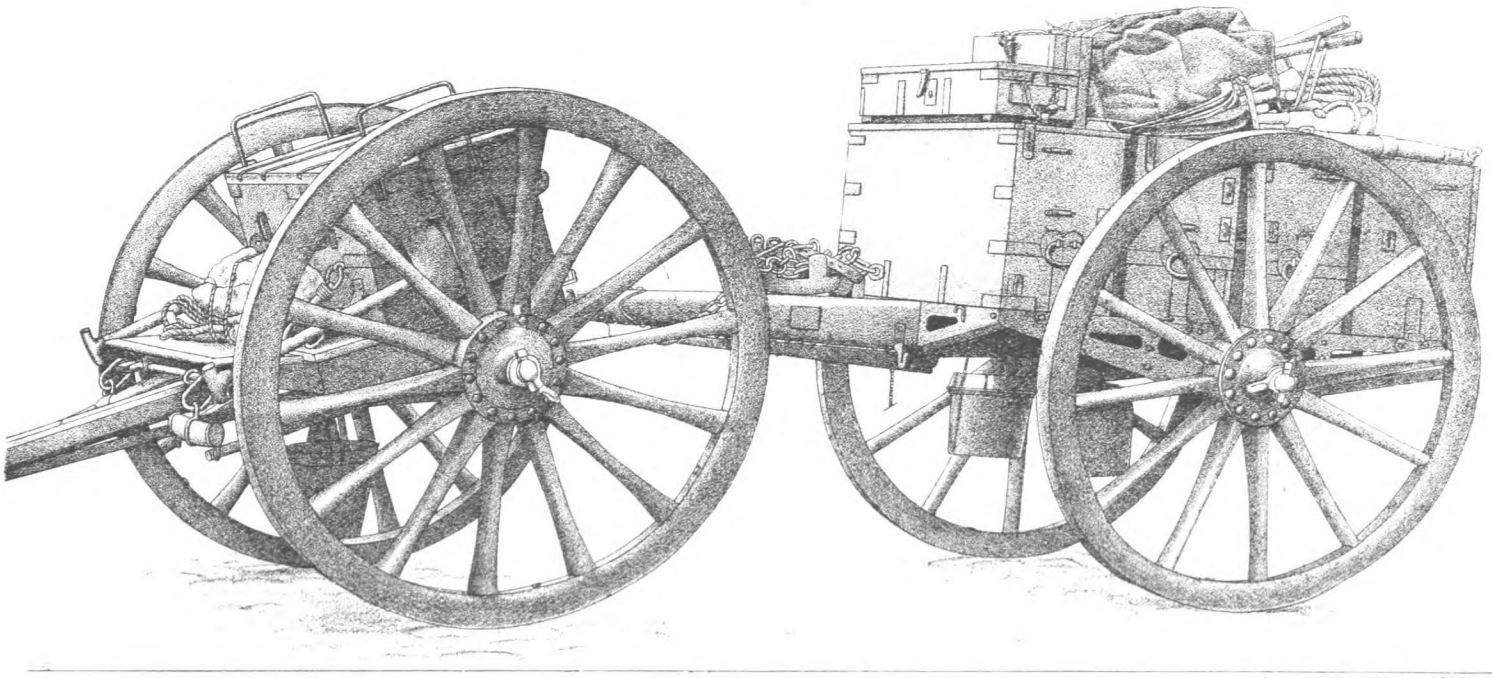


Wyman & Sons, Lt.d, Lith. 10608 6-98.

SIDE VIEW.

WAGON, STORE, R.A. (MARK I) AND LIMBER.

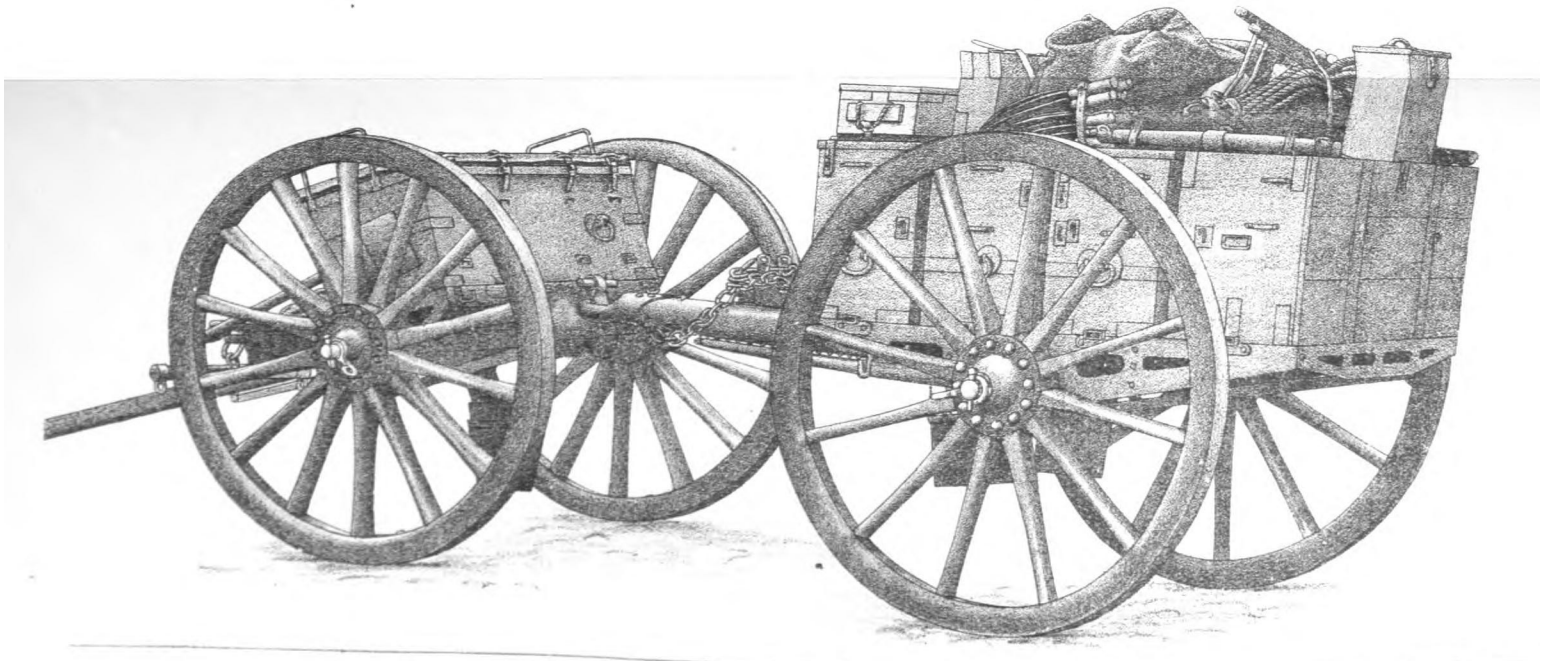


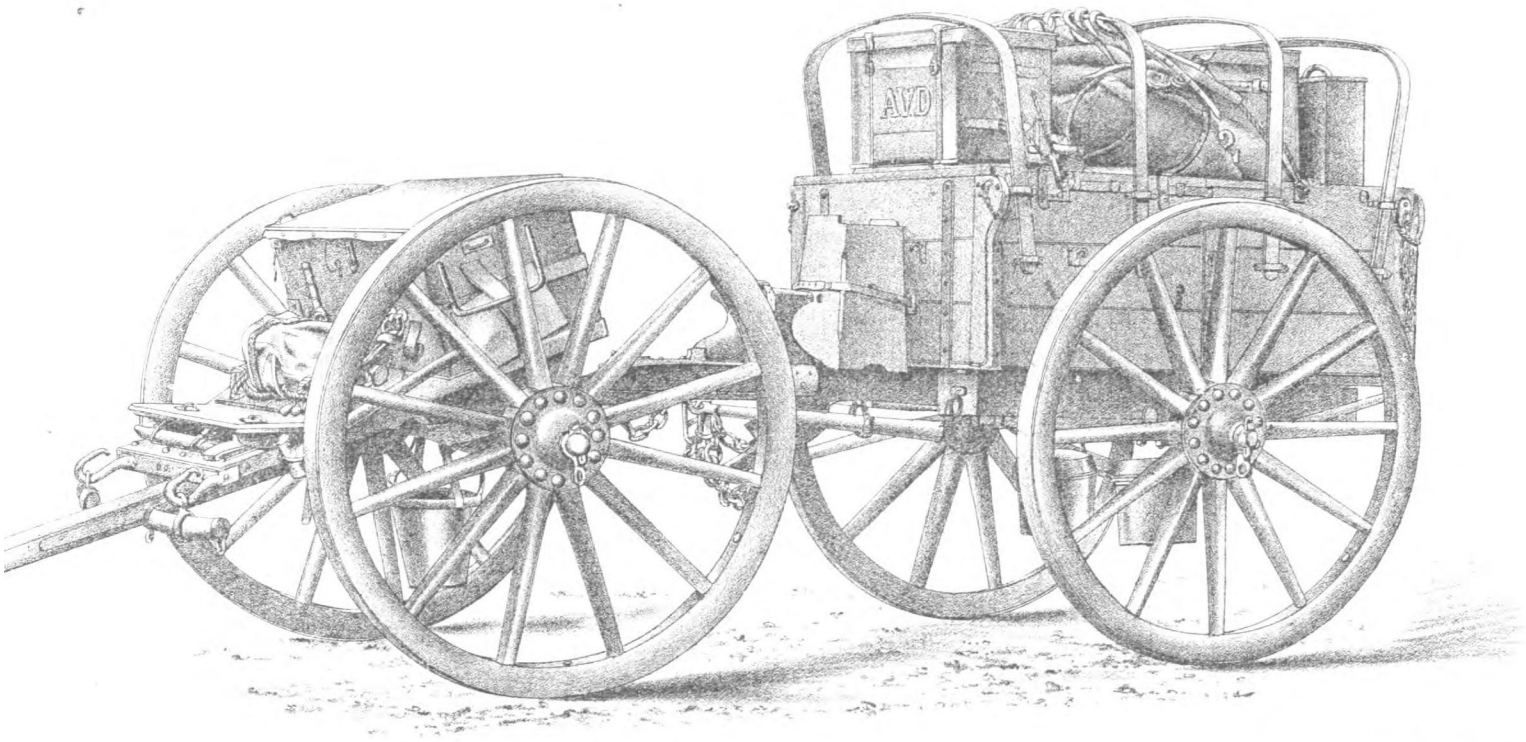


Wyman & Sons, Ltd Lith. 10508 · 6·98

SIDE VIEW.

WAGON, STORE, R.A. (MARK II) AND LIMBER.





Wyman & Sons Ltd. Lith. 10608 · 6 · 98.

SIDE VIEW.

WAGON, FORGE, (MARK I*, OR II) AND LIMBERS.